294

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Airline	GSL-1079-A	294-2
Airline	GSE-4004A, GSE-4006A, GSE-4104A Tel. Rec.	294-3
Capehart	17RPQ155F (Ch. CR-200 & CA-199)	294-4
Columbia Records	200	294-5
Firestone	13-G-183 (Codes 280-5-21T20, 280-5-21T26) Tel. Rec.	294-6
Lincoln	5BH (FDL-18805-C, -D)	294-7
Pentron	CT-1 Recorder	294-8
Philco	C-666 (Codes 121, 125)	294-9
RCA Victor	17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C) Tel. Rec.	294-10
Westinghouse	H-350T7, H-351T7 (Ch. V-2180-7, -7S) Prod. Chg. Bul. 135	294-1
Westinghouse	H-882T21(S), (V), H-882TU21, H-883T21(S), (V), H-883TU21, H-884K21(S), (V), H-884KU21, H-885K21(S), (V), H-885KU21, H-886K21(S), (V), H-886KU21, H-887K21(S), (V), H-887KU21, H-906K21(S), (V), H-906KU21, H-907K21(S), (V), H-907KU21 (Ch. V-2315, V-2325) Tel. Rec.	294-11
Zenith	R510Z1 (Ch. 5M02Z1)	294-12
Zenith	T402F, V, Y (Ch. 4T42)	294-13

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 14 IN SET 154

Westinghouse models H-350T7 and H-351T7 (Chassis V-2180-1) were covered in Photofact Folder 14 — Set 154.

In later production of the above named models, chassis V-2180-7 and V-2180-7S are used.

A comparison of these chassis show they are electrically identical, except for the following changes:

Ch. V-2180-7, V-2180-7S

COMPONENT CHANGE

C33 is removed from across R2 and connected from the junction of C5 and L1 to pin 1 of V1. At the same time it is increased from 800MMF to 5000MMF.

The low side of L1 is grounded.

R2 is connected from pin 1 of V1 to ground.

R8 is disconnected from ground and reconnected to the secondary of L6.

A 330KΩ resistor is connected across the secondary of L8.

A 47Ω resistor is connected from pin 7 of V3 to ground.

R10 is decreased from 15Meg to 3.3Meg.

A 47Ω resistor is connected from pin 7 of V4 to ground.

R22 is disconnected from ground and reconnected to pin 6 of V6.

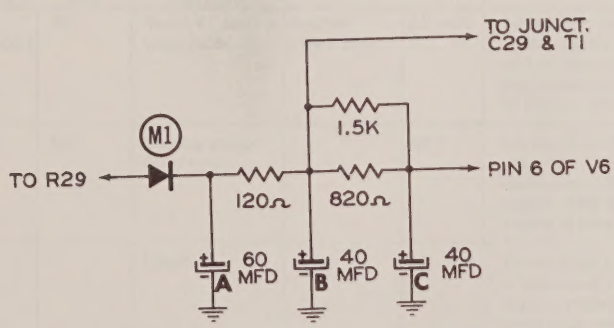
A 470KΩ resistor is connected from pin 7 of V5 to pin 6 of V6.

A 10KΩ resistor is connected from pin 6 of V6 to B+ .

Ch. V-2180-7S

NEW FILTER

Chassis V-2180-7S is electrically identical to chassis V-2180-7, except a different filtering system is used. A partial schematic showing the new circuit is given below.



WESTINGHOUSE MODELS H-350T7, H-351T7 (Ch. V-2180-7, V-2180-7S)

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PRODUCTION CHANGES
BULLETIN 135

PRODUCTION CHANGES
BULLETIN 135

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DENVER, COLORADO

AIRLINE
MODEL GSL-1079-A

AIRLINE
MODEL GSL-1079-A

TRADE NAME	Airline Model GSL-1079-A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	Three Power Portable 2 Band AM Superheterodyne Receiver
TUBES (Five)	Types 1U4 RF Amp., 1L6 Conv., 1U4 IF Amp., 1U5 Det. -AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 9 Volt "A" Supply & 90 Volt "B" Supply
RATINGS	.1 Amp. @ 117 Volts AC (or) 55MA @ 9 Volts DC & 9.5MA @ 90 Volts DC
TUNING RANGE—BROADCAST	540KC-1620KC SHORT WAVE 5.8MC-18.3MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

BC & SW ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1L6 (V2). Low side to B-.	455KC (400~ Mod.)	BC	Point of non-interference	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. IF AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	"	18.4MC	SW	Tuning gang fully open	"	A5 *	Set A6 & A7 for maximum capacity. Adjust A5 for maximum output using peak signal obtained with trimmer screw farthest out of trimmer.
3.		Loop	15MC	"	15MC	"	A6, A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		"	6.5M	"	6.5MC	"		Sensitivity check
5.		"	1620KC	BC	Tuning gang fully open	"	A8	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
6.		"	1400KC	"	1400KC	"	A9, A10	"
7.		"	600KC	"	600KC	"	A11	Adjust for maximum output while rocking tuning gang. Repeat steps 5, 6, & 7.

*Check for image freq. by setting signal generator to approx. 19.3MC and increasing generated signal. If signal fails to appear reset signal generator to 18.4MC and decrease capacity of A5 until signal is received. Recheck for image.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	1U4	1U4	6AR	
V2	Convertor	1L6	1L6	7DC	
V3	IF Amp.	1U4	1U4	6AR	
V4	Det. -AVC-AF Amp.	1U5	1U5	6BW	
V5	Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	AIRLINE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	●50	150	R-1095		TM-4067	Q-110	
B	■40	150					
C	▲40	150					
D	100	15					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

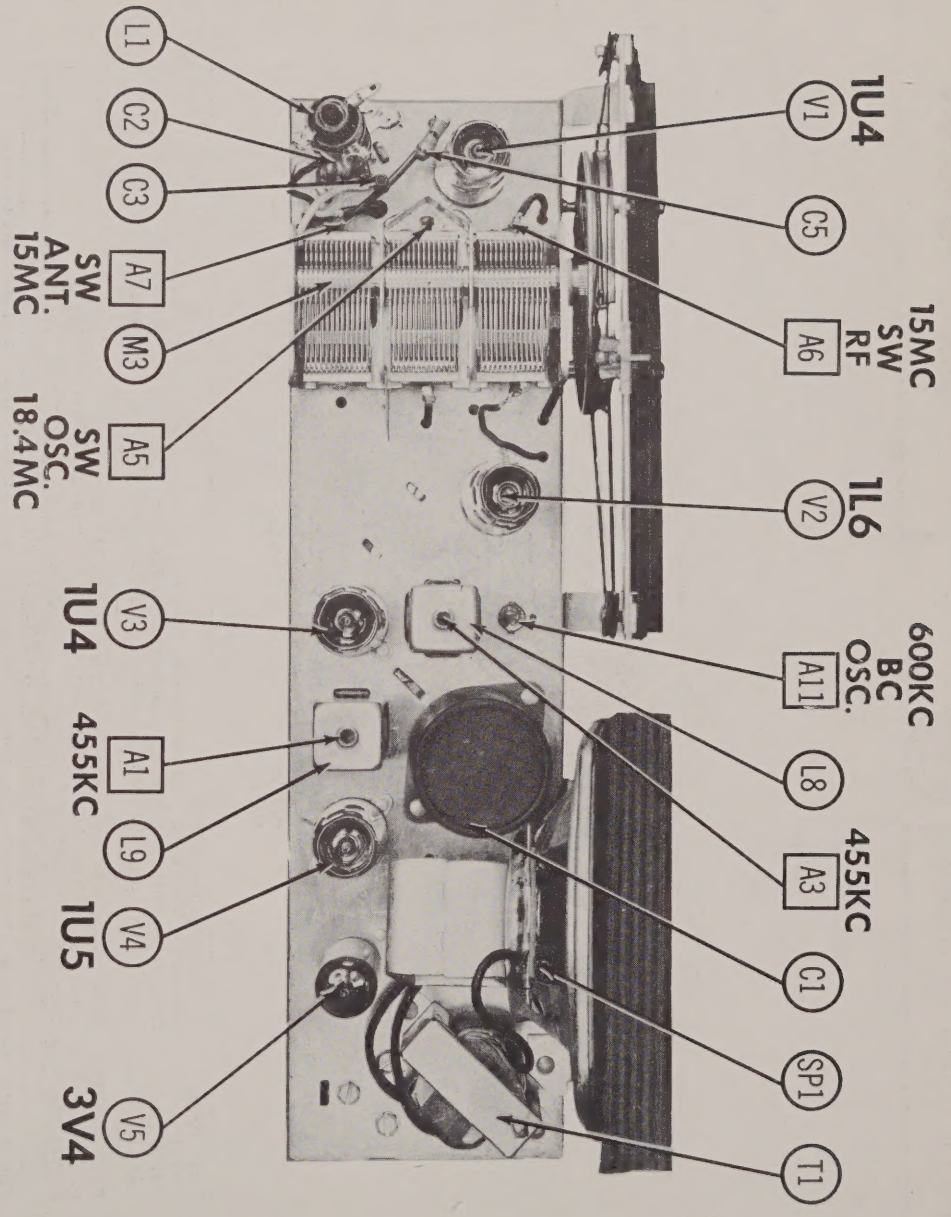
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	AIRLINE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	3			TCZ-3R3	NPOA-030		
C3	6.8		R-1271	TCZ-6R8	NPOA-6R8	ZT-5568	
C4	10000			DD-103	811-01	DC511	
C5	100			D6-101	GP1K-101	UC-531	
C6	10000			DD-103	811-01	DC511	
C7	10000			DD-103	811-01	DC511	
C8	5000			DD-502	811-005	DC525	
C9	6.8		R-1271	TCZ-6R8	NPOA-6R8	ZT-5568	
C10	10000			DD-103	811-01	DC511	
C11	10000			DD-103	811-01	DC511	
C12	.33		R-1154				
C13	50			TCZ-50	NPO-338-500		
C14	4000	500	N-1690			MCE463	
C15	575	500	R-1106				
C16	5000			DD-502	811-005	DC525	
C17	10000			DD-103	811-01	DC511	
C18	.1	200		DF-104		PT401	
C19	2000			DD-202	801-002	DC522	
C20	.1	200		DF-104		PT401	
C21A	150				811-151	UC-5315	
B	2000				801-002	DC525	
C	150		♦R-1119	♦PC-165	811-151	UC-5315	
D	10000				811-01	DC511	
E	5000				811-005	DC525	
C22	.05	200		DF-503		PT415	
C23	2000			DD-202	801-002	DC522	
C24	2000			DD-202	801-002	DC522	
C25	.1	200		DF-104		PT401	
C26	2000			DD-202	801-002	DC522	
C27	.047	400		DF-503		PT4147	

♦ Items C21A, C21B, C21C, C21D, C21E, R17A, R17B, R17C and R17D are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	R-1081	Q13-137	A47-1Meg-Z	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A
R2A	2Meg	½	R-1082	Q13-139	A47-2Meg-Z	AB-76	U-55	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA AIRLINE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R3	47KΩ	½		BTS-47K	Note 1
R4	2. 7Meg	½		BTS-2. 7Meg	
R5	3. 3Meg	½		BTS-3. 3Meg	
R6	1000Ω	½		BTS-1000	
R7	1000Ω	½		BTS-1000	
R8	27KΩ	½		BTS-27K	
R9	47KΩ	½		BTS-47K	
R10	180KΩ	½		BTS-180K	
R11	68KΩ	½		BTS-68K	
R12	1Meg	½		BTS-1Meg	
R13	220Ω	½		BTS-220	
R14	1500Ω	½		BTS-1500	
R15	1800Ω	½		BTS-1800	
R16	6. 8Meg	½		BTS-6. 8Meg	
R17A	10Meg	½	*	BTS-10Meg	
B	4. 7Meg	½	*	BTS-4. 7Meg	
C	1Meg	½	*	BTS-1Meg	
D	3. 3Meg	½	*	BTS-3. 3Meg	
R18	1500Ω	2		BTS-1500	
R19	100Ω	2.5	R-1162		
R20	82Ω	½		BTS-82	
R21	470Ω	1		BTA-470	
R22	3300Ω	3	R-1151	PWT-3300	
R23	4700Ω	2		BTB-4700	
R24					

Note 1. Some versions use a 47K ½W resistor in this application.
* Items C2IA, C2IB, C2IC, C2ID, C2IE, R17A, R17B, R17C, R17D are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	9. 2KΩ	3. 8Ω	R-1080	Z1117	A-2932	A-3879	24S52	S-17X	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA AIRLINE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	5"	PM	3. 8Ω	R-1116	5A1	

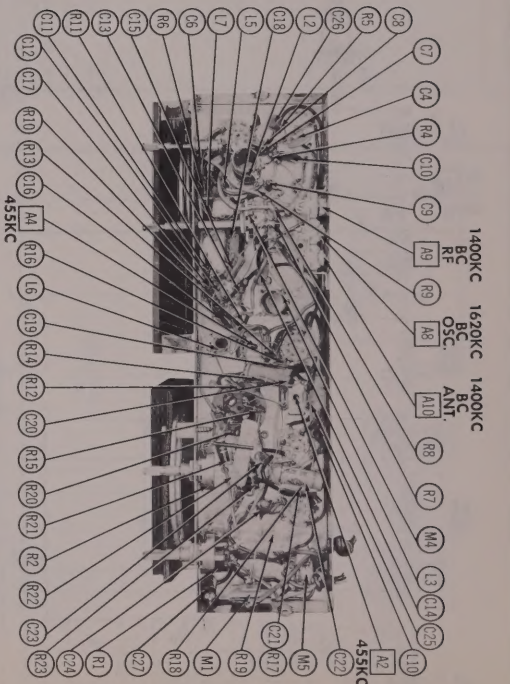
COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC	REPLACEMENT DATA AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	SW Ant. Coil	5.3Ω	0Ω	R-1097	14-1044			
L2	SW RF Coil	1Ω	0Ω	R-1098	14-1045			
L3	SW Osc. Coil	. 8Ω	0Ω	R-1099				
L4	BC Loop Ant.	2Ω		R-1086				Includes cabinet back.
L5	BC RF Coil	6.5Ω		R-1101	19-1301		8164	
L6	BC Osc. Coil	. 8Ω	3. 9Ω	R-1102	14-1040	BC-387	71-Osc.	
L7	Fil. Choke	0Ω		R-1172	19-1000		4603	1 Microhenry
L8	Input IF	14Ω	14Ω	N-7981	16-5758	BC-388	12-C1	
L9	Output IF	14Ω	14Ω	N-7981	16-5758	BC-388	12-C2	
L10	RF Choke	0Ω		R-1160				

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA AIRLINE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	. 054	N-8331	1263A	R8085	6S85	6J1	65	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

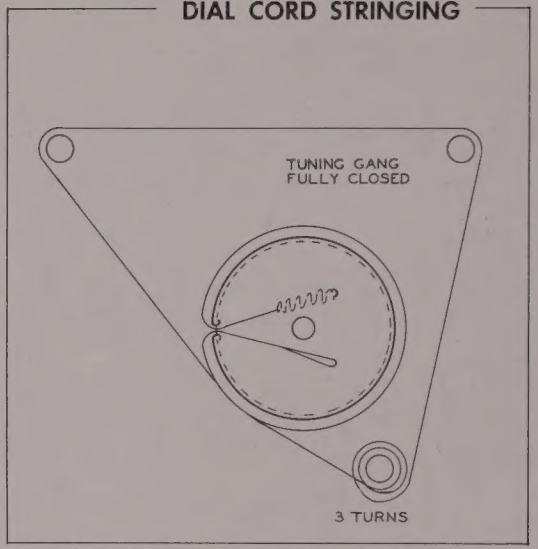
BATTERIES

ITEM No.	VOLTAGE	AIRLINE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	9V "A" 90V "B"				753			F6A60	

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Tuning Cap.	R-1348	3 Gang (16-455MMF, 16-455MMF, 16-455MMF)
M4	Switch	R-1049	Band (Rotary-Wafer Type)
M5	Switch	R-1103	Power Changeover (3 Pole-2 Position)
	Trimmer Cap.	R-1083	3 Section Trimmer: SW Osc. Trimmer, BC Osc. Trimmer & BC RF Trimmer
	Antenna	R-1120	Telescope
	Cabinet	#516	
	Knob	R-1354	On-Off-Volume
	Knob	R-1355	Tuning, Bandswitch, & Tone

DIAL CORD STRINGING



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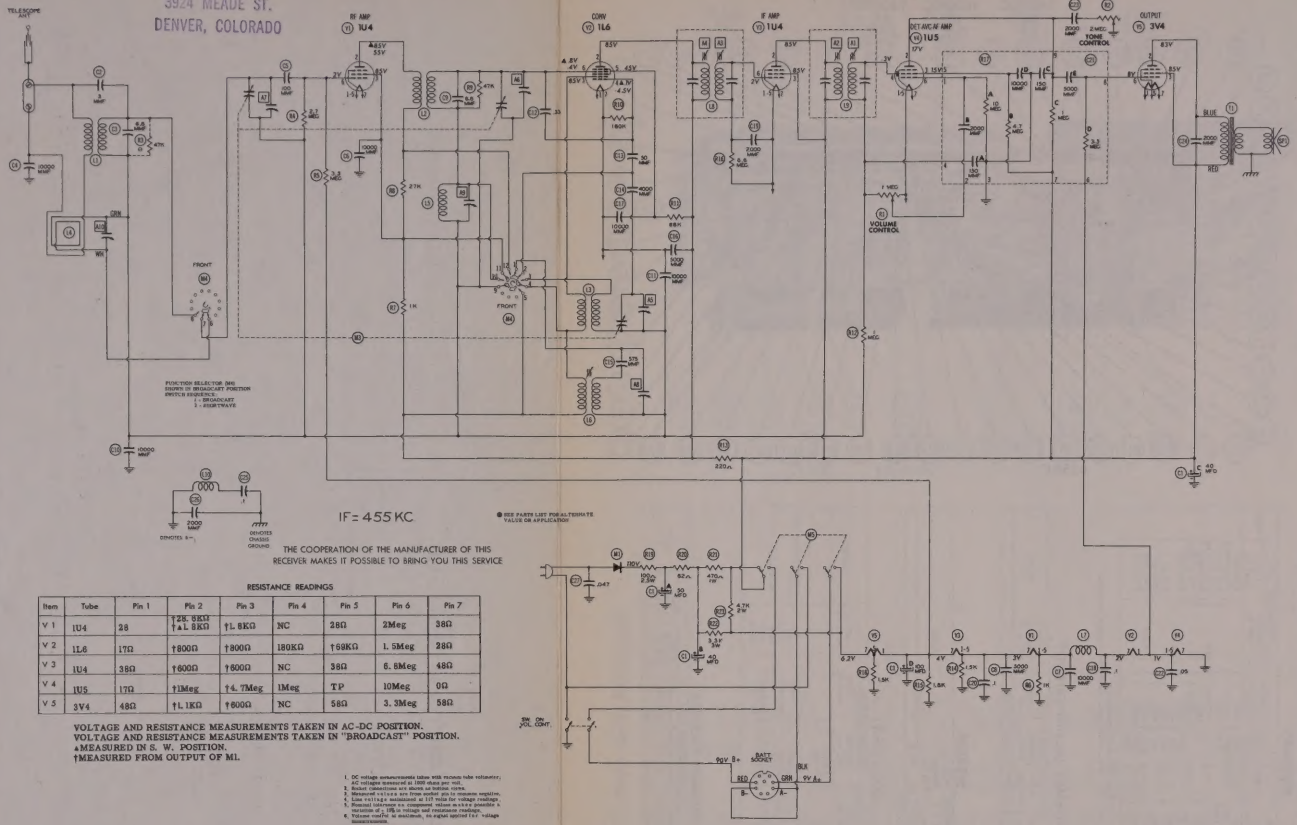

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1U4	2Ω	†28. 8KΩ †▲L 8KΩ	†L 8KΩ	NC	2Ω	2Meg	3Ω
V 2	1L6	17Ω	†800Ω	†800Ω	180KΩ	†69KΩ	1. 5Meg	2Ω
V 3	1U4	3Ω	†600Ω	†600Ω	NC	3Ω	6. 8Meg	4Ω
V 4	1U5	17Ω	†1Meg	†4. 7Meg	1Meg	TP	10Meg	0Ω
V 5	3V4	4Ω	†L 1KΩ	†600Ω	NC	5Ω	3. 3Meg	5Ω

VOLTAGE AND RESISTANCE MEASUREMENTS TAKEN IN AC-DC POSITION.
VOLTAGE AND RESISTANCE MEASUREMENTS TAKEN IN "BROADCAST" POSITION.
▲MEASURED IN S. W. POSITION.
†MEASURED FROM OUTPUT OF M1.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage is 117 volts AC, 60 cycles, unless otherwise noted.
5. Nominal tolerance on component values is ±20% unless otherwise specified.
6. Variation of ± 10% in voltage and resistance readings.
7. Volume control in maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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PHOTOFACT* Folder

AIRLINE MODELS GSE-4004A, GSE-4006A, GSE-4104A

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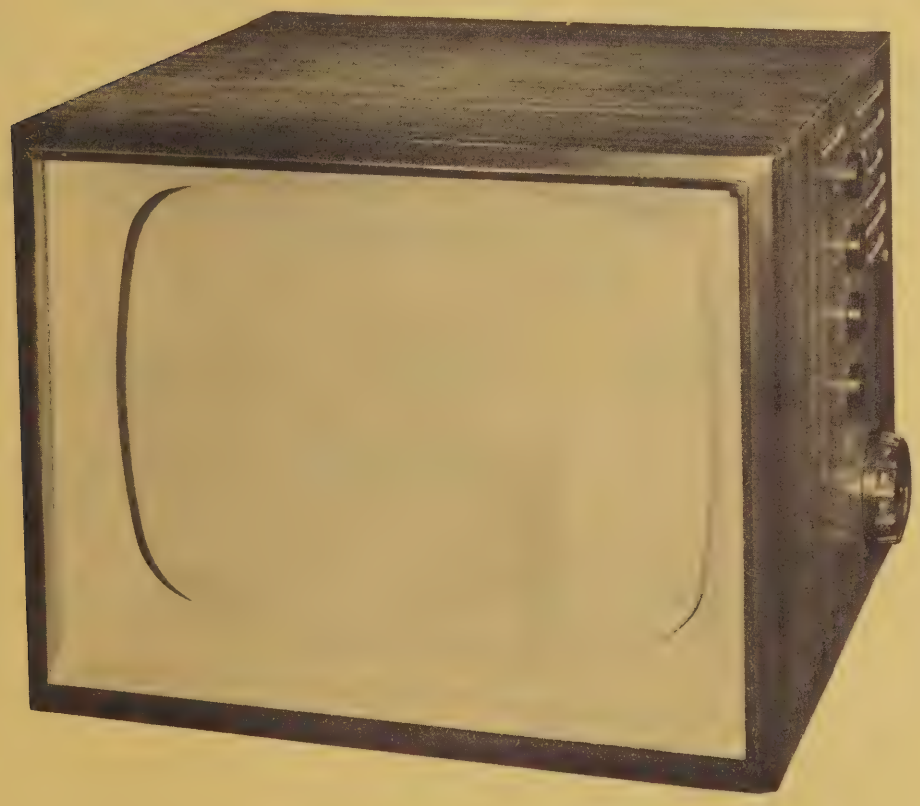

MODEL GSE-4006A

AIRLINE MODELS GSE-4004A, GSE-4006A, GSE-4104A

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DATE 10-55 SET 294 FOLDER 3

AIRLINE MODELS GSE-4004A, GSE-4006A, GSE-4104A

F
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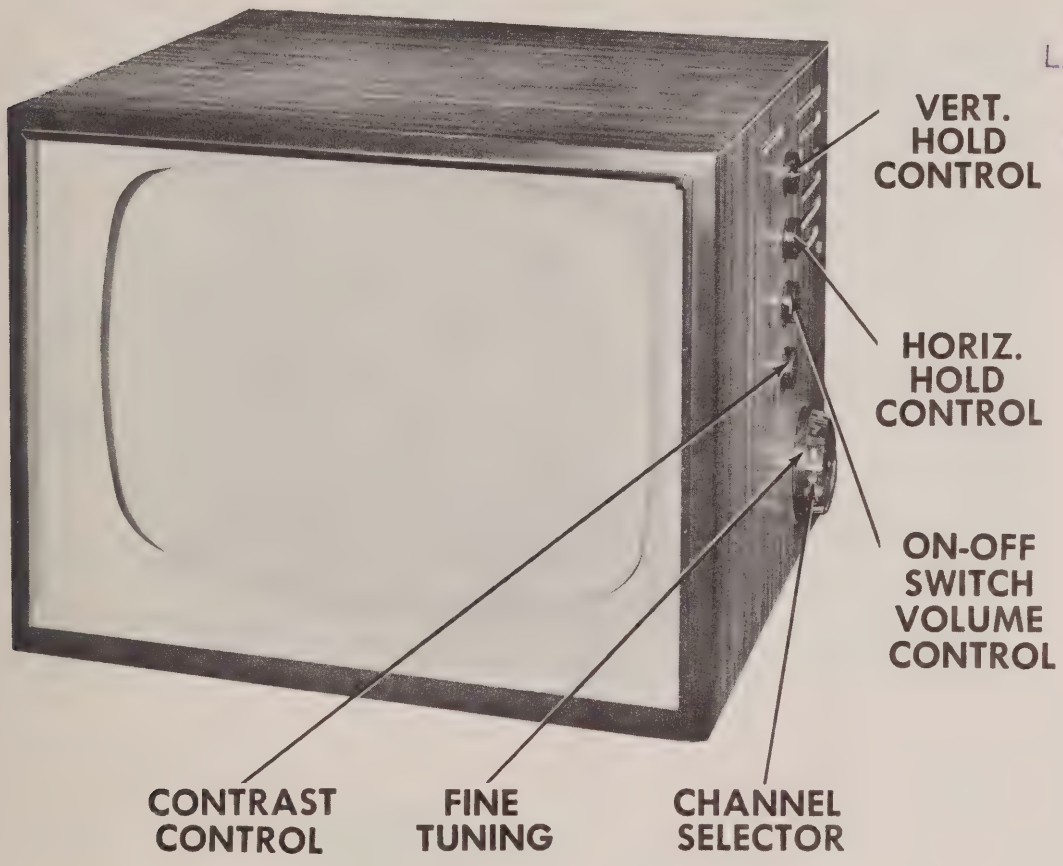

AIRLINE MODELS GSE-4004A, GSE-4006A, GSE-4104A

AIRLINE MODEL GSE-4006A

TRADE NAME	Airline Models GSE-4004A, GSE-4006A, GSE-4104A
SUPPLIER	Montgromery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Fifteen

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING 1.14 Amp. @ 117 Volts AC
TUNING RANGE Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 26.4MC, Sound IF 21.9MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Rear View 13
Chassis-Top View 3
RF Tuner 10, 13
Resistor Identification 19, 20
Photographs (Con't)
Trans., Inductor & Alignment Identification 3
Resistance Measurements 8
Servicing in the Field 18
Schematic (TV) 2
Schematic (UHF Tuner) 17
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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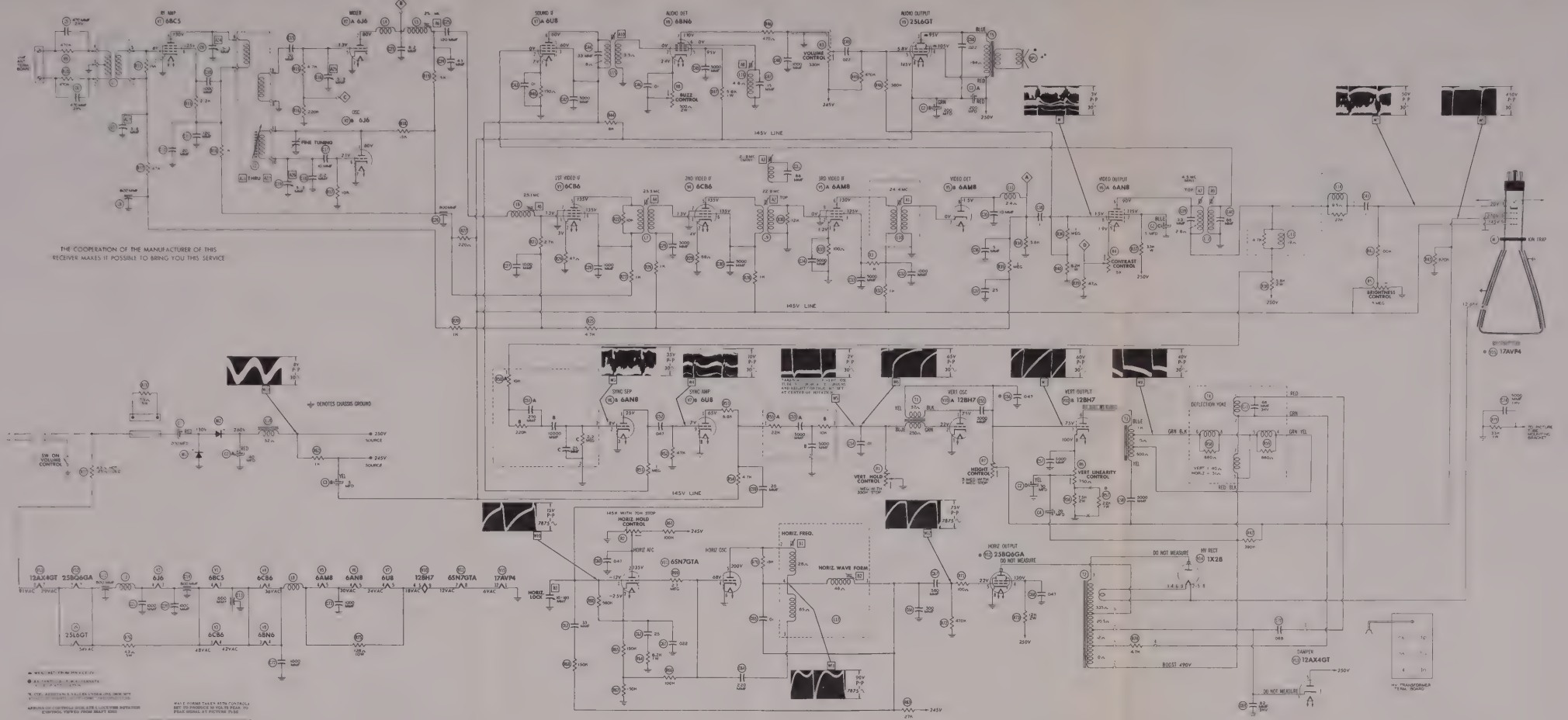
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
145V LINE
HORIZ. FREQ.
HORIZ. WAVE FORM
DO NOT MEASURE
BOOST +90V
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AIRLINE MODELS GSE-4004A, GSE-4006A, GSE-4104A

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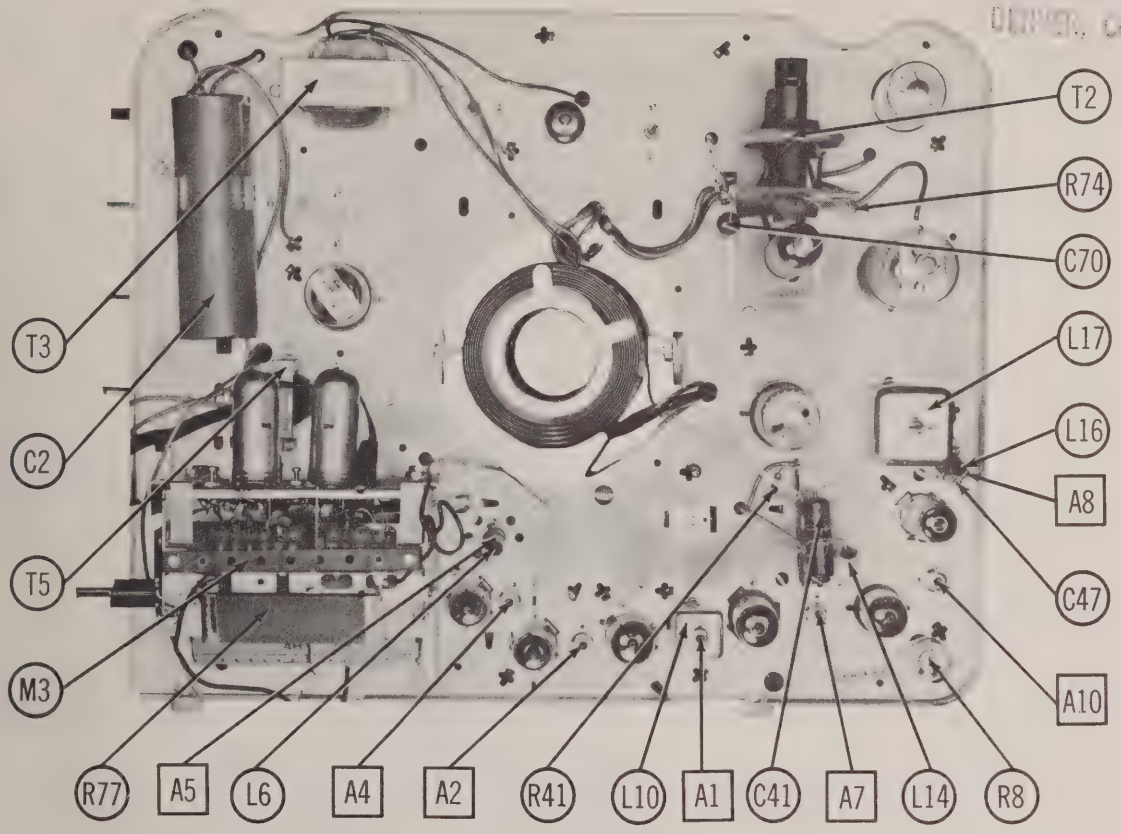
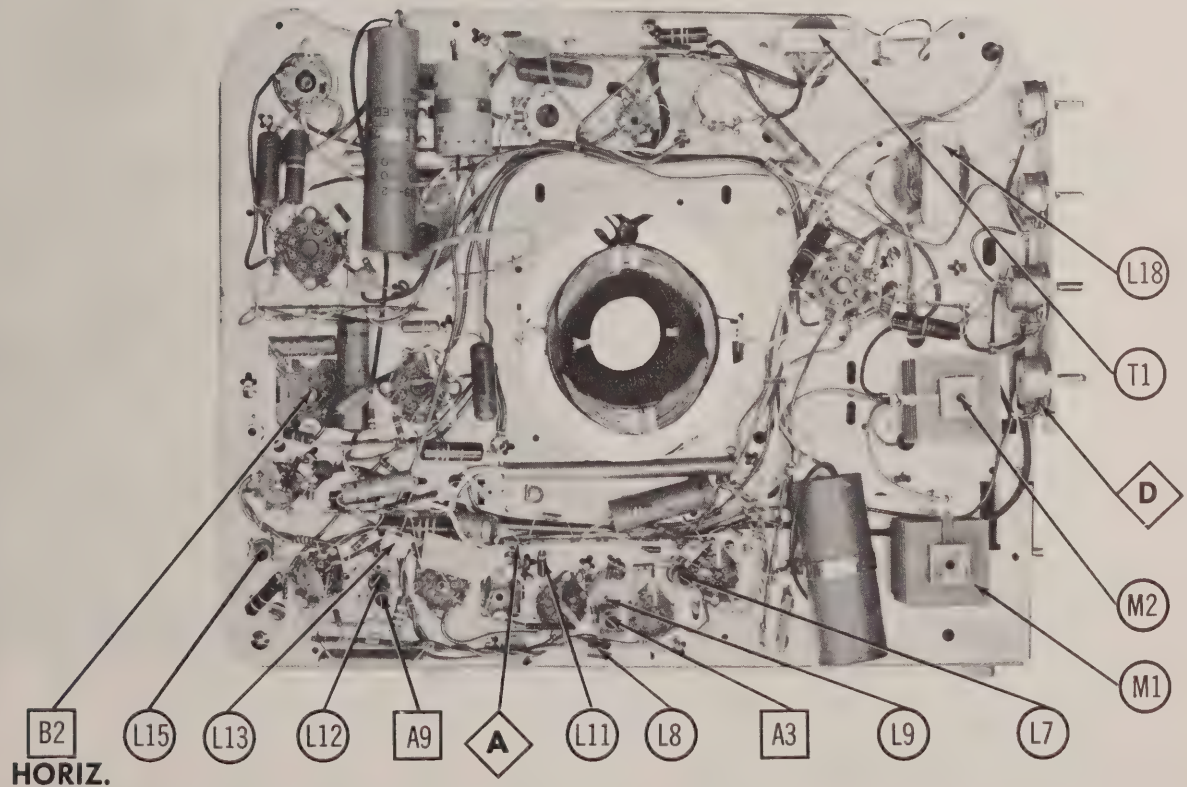
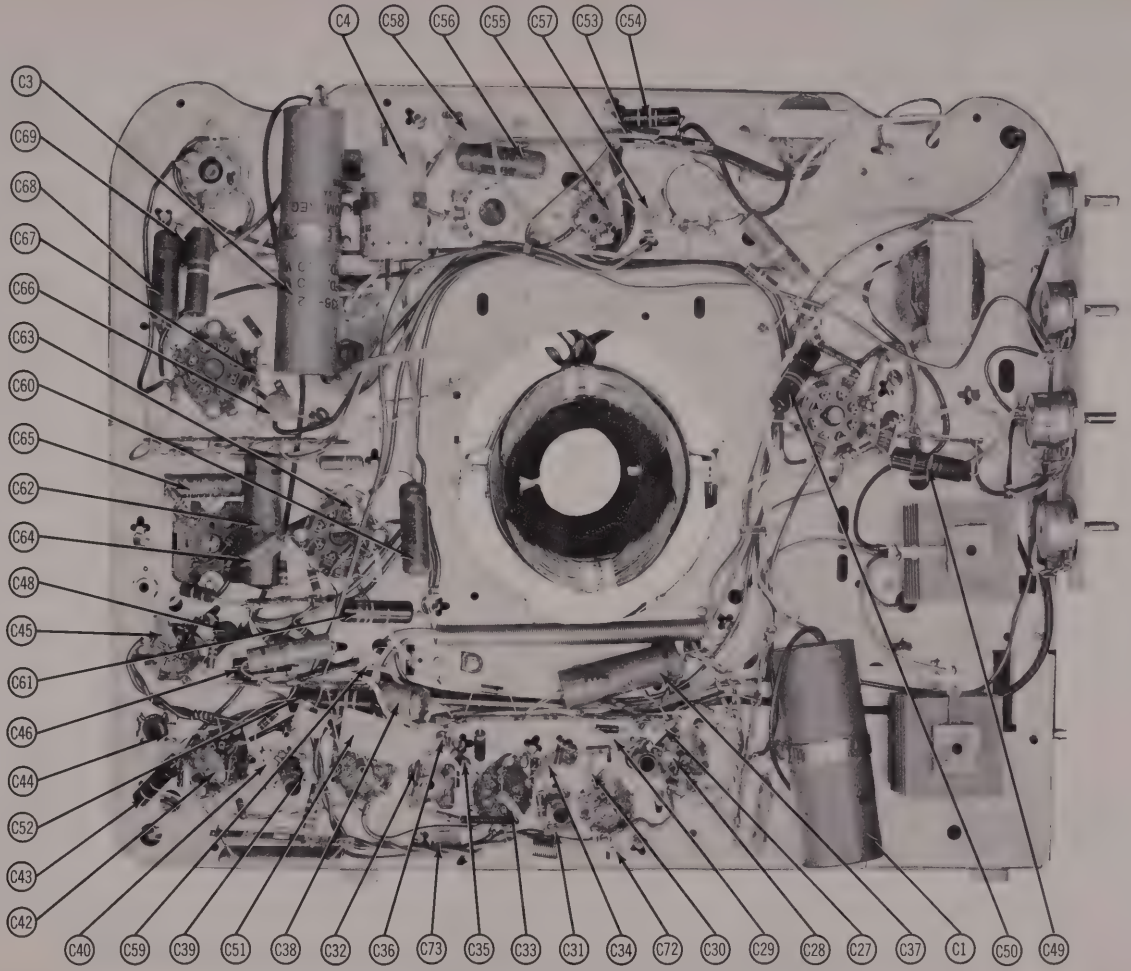


CHASSIS TOP VIEW



HORIZ. WAVE FORM

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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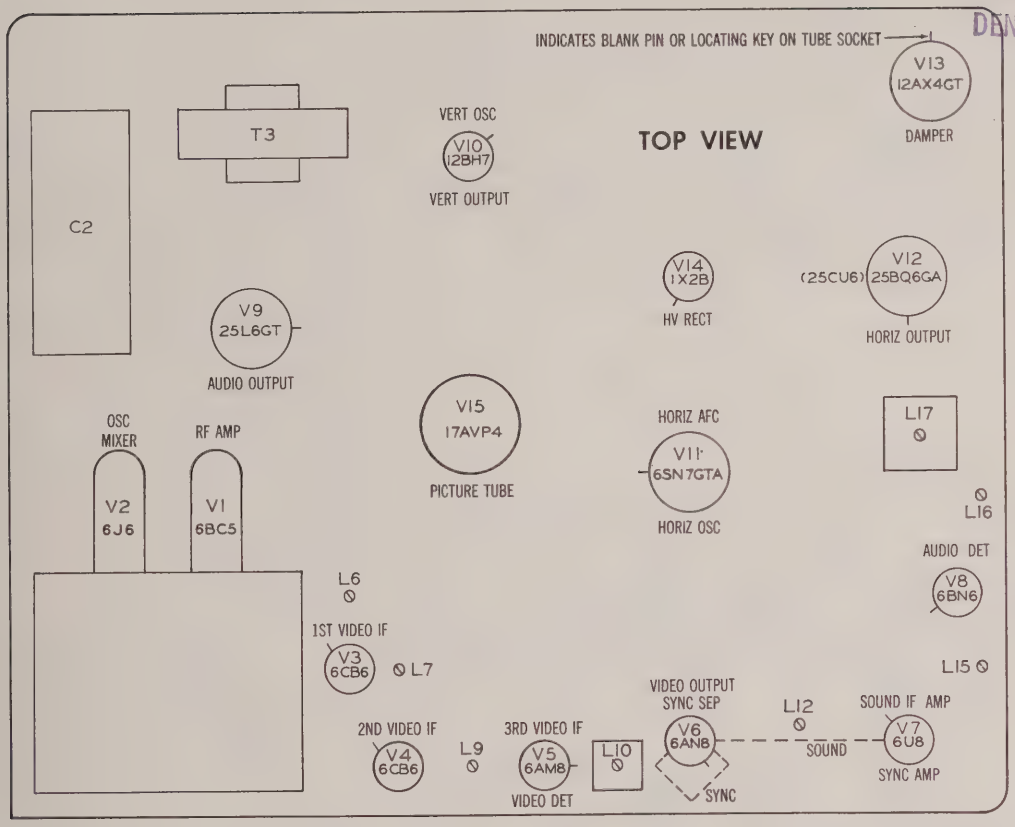
L. F. [illegible]SHIP
[illegible] ST.
DENVER, COLORADO

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

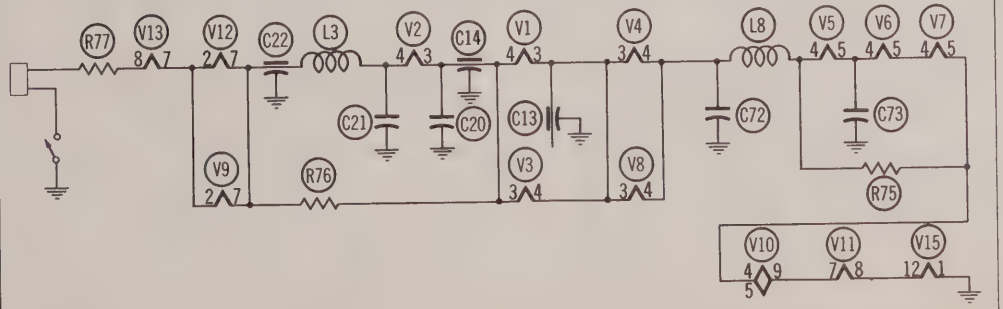
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V9**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V15**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V7, V10**
No horiz. sync - **V7, V11**
No vert. or horiz. sync - **V6, V7**

SWEEP FAILURE
No raster, has sound - **V11, V12, V13, V14, V15**
No vertical deflection - **V10**
Poor vert. linearity or foldover - **V10**
Poor horiz. linearity or foldover - **V11, V12, V13**
Narrow picture - **V11, V12, V13, V14, M1, M2**
Vert. off freq. - **V7, V10**
Horiz. off freq. - **V7, V11**

NOTE: Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
NOTE: One side of the chassis is connected to the power line.
The high voltage lead should be taped and kept away from the chassis. Keep output from sweep and signal generator and contrast control low enough to prevent overloading of circuits.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to the tuner AGC (white) lead. Positive lead to chassis.
Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Attenuate the generator output to maintain approximately - 2 volts on VTVM unless another value is specified.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to point Ⓑ. Low side to chassis.	24.4MC (Unmod)	Any	DC probe to point Ⓐ. Common to chassis.	A1	Adjust for maximum deflection. Attenuate generator for reading of -1.5 volts on VTVM at peak reading.
2.	"	"	22.9MC	"	"	A2	Adjust for maximum deflection. If two peaks occur, use the peak nearest clip end of the coil.
3.	"	"	21.9MC	"	"	A3	Adjust for MINIMUM deflection. Use enough generator output to produce .5 volts deflection minimum reading. Use the null obtained with the core nearest the clip end of the coil. Repeat steps 2 and 3.
4.	"	"	25.5MC	"	"	A4	Adjust for maximum deflection.
5.	"	"	25.1MC	"	"	A5	Adjust for maximum deflection. Use peak nearest clip end of coil.
6.	"	High side to point Ⓒ. Low side to chassis.	25.1MC	"	"	A6	Shunt L6 with 100Ω resistor in series with .001MFD capacitor. Adjust A6 for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

Leave bias connected as under "Video IF Alignment". Use only enough sweep generator and marker output to provide useable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the contrast control for minimum contrast.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.9MC 25.1MC 25.5MC 26.4MC	Any	Vert. Amp. thru 10KΩ to point Ⓓ. Low side to chassis.		Check for response curve similar to Fig. 1. SLIGHTLY retouch A1 thru A6 to obtain desired response. If desired response cannot be obtained with slight retouching of A1 thru A6, steps 1 thru 6 should be repeated. Replace original 6J6 in its socket.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to pin 11 (cathode) of picture tube. Low side to chassis.	Not used	4.5MC	Any non-interfering channel	Use VTVM. Connect across secondary of T5.	A7	Adjust for MINIMUM deflection on VTVM.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Turn the set on and tune in a strong TV signal. Turn the buzz control (R8) 90° maximum from clockwise rotation. Adjust A8 for maximum volume.
Reduce the signal strength. (Remove the antenna from antenna terminals and stray feed the signal by placing antenna near antenna terminals.) Adjust A9 and A10 for maximum volume. Adjust R8 for minimum noise. Reconnect antenna and readjust A8 for maximum volume. If necessary, reduce volume so this peak can be heard.

ALTERNATE SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR, AM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set volume control at a low volume level.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.01MFD	High side to pin 8 (grid) of 6AN8 (V6A). Low side to chassis.	4.5MC (400∿Mod) (50KC Swp)	4.5MC	Any non-interfering channel	Across secondary of T5.	A8	Set buzz control (R8) 90 degrees from maximum clockwise rotation. Adjust A8 for maximum 400∿ indication on scope.
10.	"	"	"	"	"	"	A10, A9	Attenuate generator output so that signal is below the limiting level of the 6BN6 as evidenced by background hiss and noise. Adjust A10 and A9 for maximum 400∿ response on scope.
11.	"	"	"	4.5MC (400∿Mod)	"	"	R8	Use a high generator output and adjust R8 for MINIMUM 400∿ indication on scope.
12.	"	"	"	4.5MC	"	"	A8	With volume control at low level, retouch A8 for maximum 400∿ indication on scope.

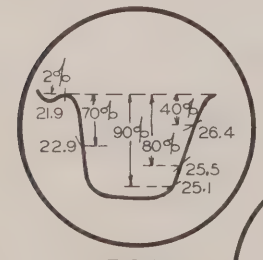


FIG. 1

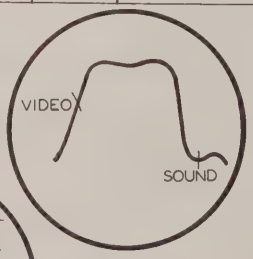


FIG. 2

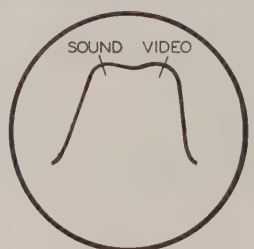


FIG. 3

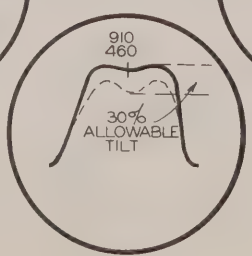


FIG. 4

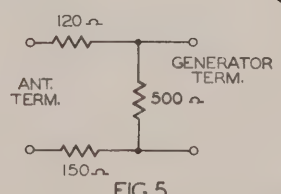


FIG. 5

ALIGNMENT INSTRUCTIONS (cont)

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OSCILLATOR ALIGNMENT

The channel oscillator adjustment screws are reached through a hole just below the channel switch shaft. The correct adjustment screws are accessible through this hole as the channel switch is turned to each channel.
Remove the dummy converter tube and replace the original 6J6 in its socket. Complete oscillator alignment may not be necessary.
If the oscillator seems to be off frequency approximately the same amount for a majority of the channels, it may be possible to correct them in one step using A26 adjustment. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A26 will not bring all channels within range of the fine tuning control, it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. Connect bias as in "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characterisitic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 2. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A12	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A13	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A14	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A15	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A16	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A17	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A18	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A19	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A20	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A21	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A22	

RF AND MIXER ALIGNMENT

Connect bias as under "Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (C). Low side to chassis.	A23, A24, A25	Adjust for response similar to Fig. 3.
15.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make SLIGHT compromise adjustment of A23, A24 and A25 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

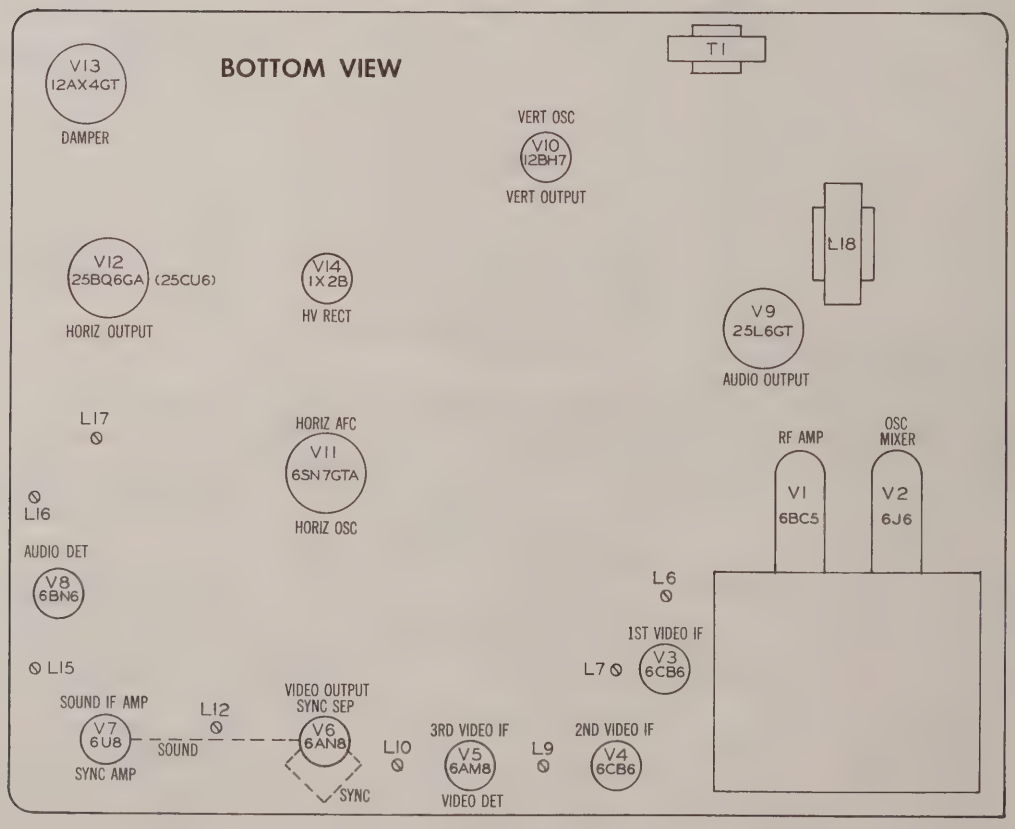
Turn the VHF tuner to channel 5 or 6 and set VHF-UHF switch to UHF position.
Detune L5 by turning 7 turns counter clockwise .
Remove dial cord and mounting screws from UHF tuner.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Fig. 5	Across UHF antenna terminals thru (Fig. 5) matching pad.	460MC (20MC Swp)	460MC	5 or 6	Vert. Amp. thru 10KΩ to point (C) on VHF tuner. Low side to chassis.	A27	Rotate UHF tuner dial fully counter clockwise. Adjust A27 to place 460MC marker in center of response curve (Fig. 4).
17.	"	"	910MC (20MC Swp)	910MC	"	"		Rotate UHF tuner dial fully clockwise. Move by bending oscillator end inductor ribbon connected to adjustment A27 to place 910MC marker in center of response curve (Fig. 4).
18.	"	"	460MC (20MC Swp)	460MC	"	"	A28, A29	Rotate UHF tuner dial fully counter clockwise. Adjust for maximum response and minimum tilt.
19.	"	"	910MC (20MC Swp)	910MC	"	"		Rotate UHF tuner dial fully clockwise. Move by bending the antenna and mixer end inductor ribbons connected to A28, and A29 for maximum response and minimum tilt. Return coil adjustment slug (L5) to its position before starting UHF tuner alignment. Turn L5 clockwise seven turns.

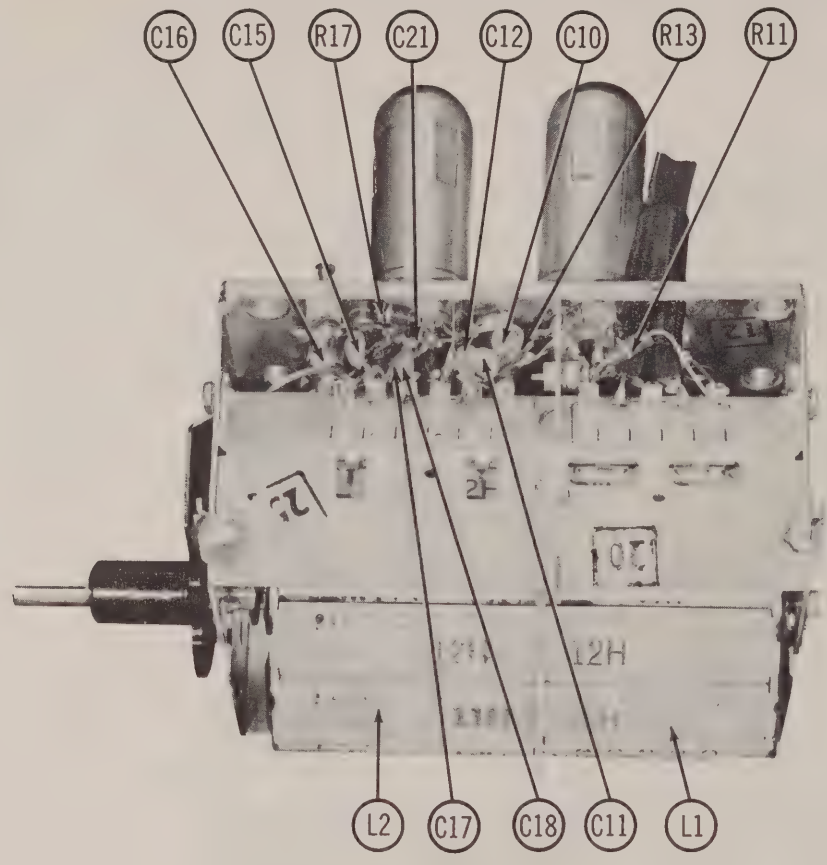
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	13Ω	15Ω	■1. 2KΩ	■3. 4KΩ	0Ω		
V 2	6J5	■15KΩ	■15KΩ	15Ω	17Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	15Ω	13Ω	■1. 2KΩ	■1. 2KΩ	0Ω		
V 4	6CB6	1Meg	68Ω	13Ω	11Ω	■1KΩ	■1KΩ	0Ω		
V 5	6AM8	100Ω	. 4Ω	■2KΩ	11Ω	10Ω	■1KΩ	. 5Ω	5. 6KΩ	0Ω
V 6	6AN8	■1Meg	2. 2Meg	0Ω	10Ω	8Ω	†5. 6KΩ	†33KΩ	1Meg	130Ω
V 7	6U8	■12KΩ	. 8Ω	■18KΩ	8Ω	6Ω	■18KΩ	150Ω	0Ω	47KΩ
V 8	6BN6	300Ω	3. 5Ω	13Ω	11Ω	■5. 6KΩ	4. 8Ω	†330KΩ		
V 9	25L6GT	NC	23Ω	†250Ω	†52Ω	280KΩ	TP	17Ω	200KΩ	
V 10	12BH7	▲1. 6Meg	600KΩ	0Ω	6Ω	6Ω	▲1. 3KΩ	▲1. 6Meg	6. 5KΩ	3Ω
V 11	6SN7GTA	750KΩ	†70KΩ	300KΩ	250KΩ	†28KΩ	0Ω	3Ω	1. 5Ω	
V 12	25BQ6GA	NC	23Ω	TP	†12KΩ	470KΩ	TP	17Ω	0Ω	TOP CAP ▲21Ω
V 13	12AX4GT	NC	NC	500KΩ	NC	†52Ω	NC	23Ω	26Ω	
V 14	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲356Ω
V 15	17AVP4	0Ω	0Ω	PIN 6 200KΩ	PIN 10 ▲390KΩ	PIN 11 ■500KΩ	PIN 12 1. 5Ω			

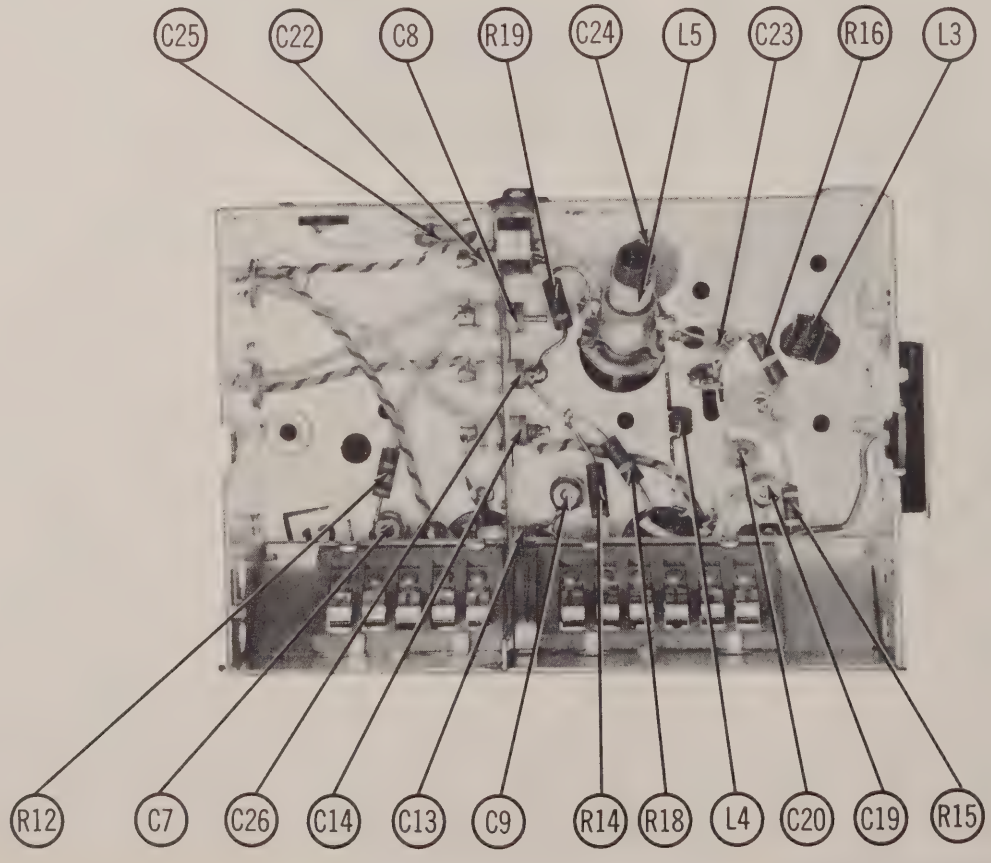
■MEASURED FROM 145V LINE.
†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V13.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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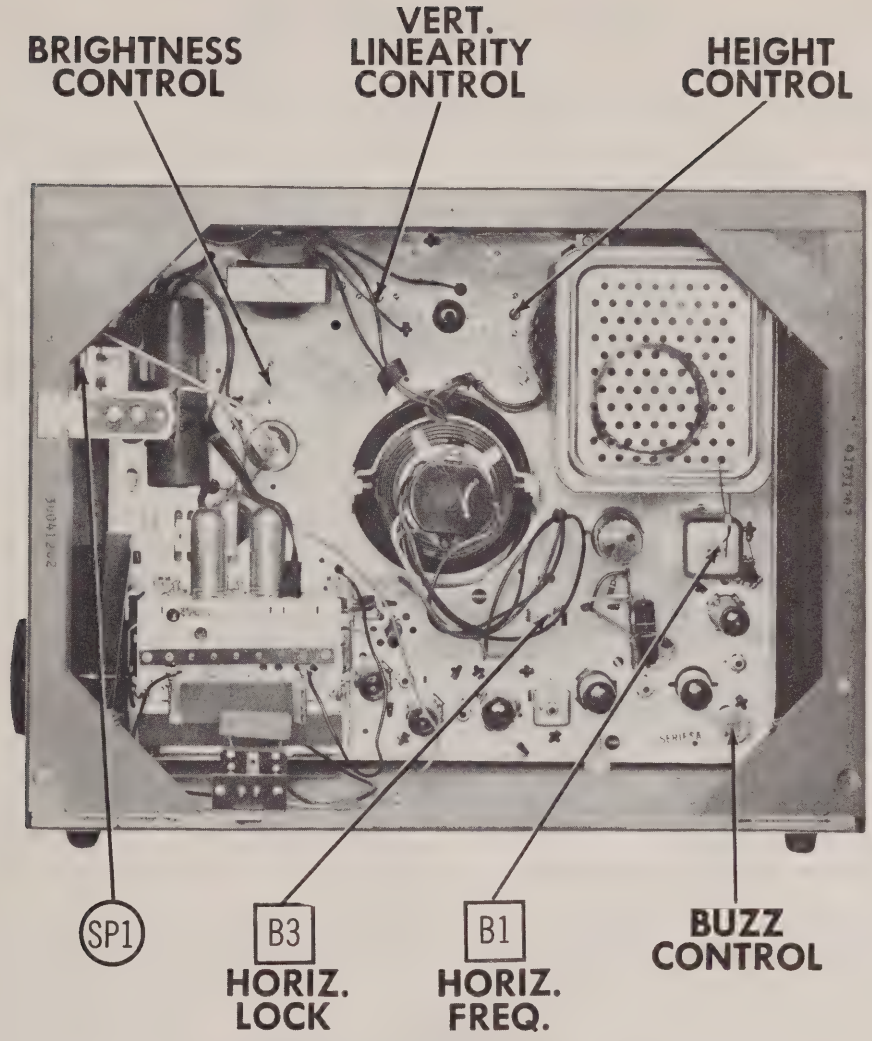

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Set contrast control for normal contrast.

1. Set the horizontal hold control to its mid-range position and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

2. Connect the vertical amplifier of an oscilloscope thru 10MMF to lug 4 of L17. Connect the low side to chassis. Adjust the horizontal waveform slug (B2) until waveform similar to Fig. 6 is obtained. While making this adjustment keep the picture in sync with the horizontal hold control, and if necessary, B1 and the horizontal lock trimmer (B3).

3. Turn the horizontal hold control fully clockwise. Turn B1 counter clockwise until the picture is just ready to pull-in sync.

4. Turn the horizontal hold control fully counter clockwise. Picture should remain in sync. Momentarily remove the signal by switching off the channel and back again. If more than seven bars are present, adjust the horizontal lock trimmer (B3) slightly counter clockwise until 3 or 4 bars appear when switching off channel and back again. If less than three bars are present when switching off channel and back again, adjust B3 slightly clockwise and check by switching off channel and back again. Repeat steps 3 and 4 until the effective pull-in range of the horizontal hold control is from 60 to 120 degrees.

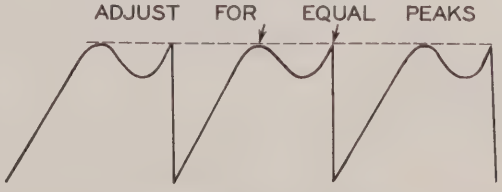

FIG. 6

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check M1 and M2. Check C1, C66, C67, R73, R78, T2, T4A and other associated components.

DRIVE LINES

Check by substitution V12 and V13. Check C66, C67, R73, T2, T4A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V12 and V13. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V11, V12 and V13. Check C61 and C62 for open. Check L17, R64, R2 and other associated components.

XMAS TREE EFFECT

Check by substitution V11, V12 and V13. Check T2 and T4 for internal arcing. Check L17, C60, C63, R68, C64 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V10, Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C57, C4, C2D, R56, R57 and other associated components.	Check T1, C56, R7, R42 and other associated components.

INSUFFICIENT SWEEP

Substitute V10. Check height and vertical linearity controls for proper operation.

COMPRESSED AT BOTTOM

Substitute V10. Check R7, R42, T1 and other associated components.

COMPRESSED AT TOP

Substitute V10. Check R56, R57, R6, C4, C2D, C57, T3 and other associated components.

FOLDS

Substitute V10. Check C56, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V7. Check C51, C52, R51, R53 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V10. Check integrator network. Check T1, R1 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Substitute V11. Check C59, C61, C62, R2, R61, R64 and other associated components.

HORIZONTAL BENDING

Check substitution V6, V7 and V11. Check components associated with V11.

VIDEO

LOSS OF VIDEO

Substitute V6. Check R37, R38, R39, C38, C41, C2C and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A7. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check R39, L13, L14, C38, C41 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check Picture tube. Check C38, C41, L14 and other associated components.

SMEAR

Substitute V6. Check L11, L13, L14, R39, C38, C41 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8 and V9. Check stages V8 and V9 using audio signal generator. Apply audio signal across C48.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C48, C49, C50, R46, R48, R49, T5, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments A8 and R8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check all tubes. These tubes are connected in series. Check switch on volume control and R77. Check AC interlock assembly. If filaments light, check M1, M2, C1 and R78. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1, M2, C1 and R78. Check B+ filter and decoupling network.

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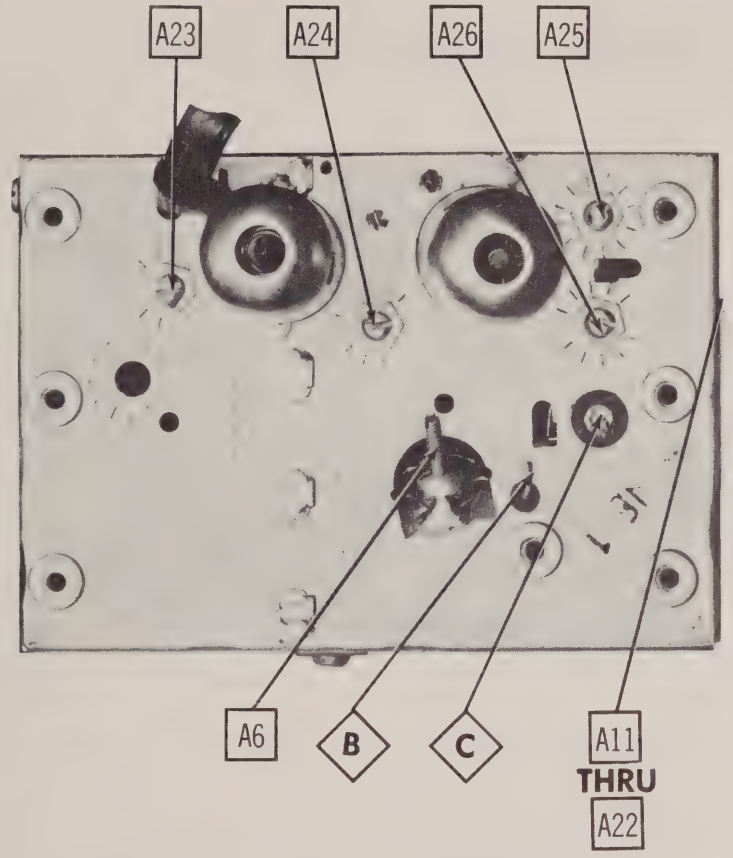
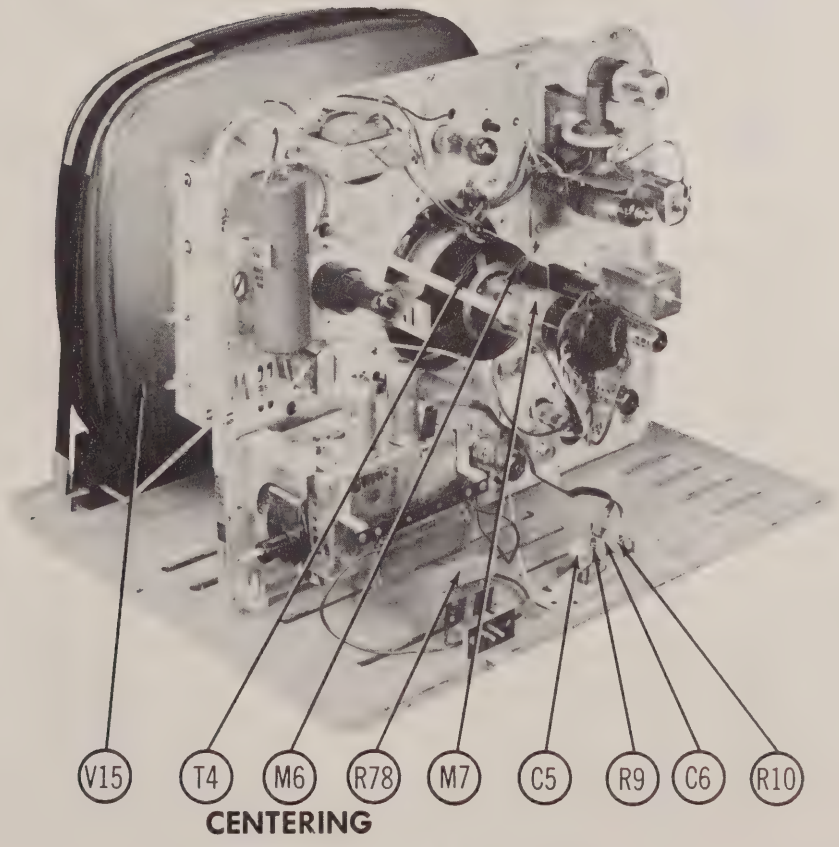
8924 WADE ST.
DENVER, COLORADO



RF TUNER-TOP VIEW



CHASSIS-REAR VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA: AIRLINE PART No	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amp.	6BC5	6BC5	7BD	
V2	Mixer-Osc	6J6	6J6	7BF	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp. - Video Det	6AM8	6AM8	9CY	
V6	Video Output - Sync Sep.	6AN8	6AN8	9DA	
V7	Sound IF Amp. - Sync Amp.	6U8	6U8	9AE	
V8	Audio Det.	6BN6	6BN6	7DP	
V9	Audio Output	25L6GT	25L6GT	7D	
V10	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V11	Horiz. AFC - Horiz. Osc.	6SN7GTA	6SN7GTA	8BD	
V12	Horiz. Output	25BQ6GA	25BQ6GA	6AM	25CU6 Alternate
V13	Damper	12AX4GT	12AX4GT	4CG	
V14	HV Rectifier	1X2B	1X2B	9Y	

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA: AIRLINE PART No	CBS PART No	GENERAL ELECTRIC PART No	SYLVANIA PART No	WESTINGHOUSE PART No	RETMA BASE TYPE	NOTES
V15	17AVP4	17AVP4		17AVP4		12L	1 Aluminized
		17AVP4A ①		17AVP4A ②		12L	2 Silver Screen
	21ATP4	21ATP4	21ATP4	21ATP4 ②	21ATP4	12L	
			21ATP4A ①			12L	
		21ALP4A ①				12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: AIRLINE PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	NOTES
C1	300	200	B158557-1-1	WB343	TD-200-300	D-100	
C1A	140	200	B157838-3-1	WQ505	CDB-1008	Q-163	
B	300	150					
C	5	200					
D	30	150					
C2A	300	150	B157838-1-3	WD345	TDL-305	D-089	
B	5	150					
C4	30	450	B157903-1-2	TC75	TD-30-450	FM-4530	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: AIRLINE PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C5	470	2000	B156201-1-1	DD30-471	3KV-471	DC30347	
C6	470	2000	B156201-1-1	DD30-471	3KV-471	DC30347	
C7	5-45		156206-16	822-10			
C8	800		156186-8				
C9	5-3		156906-5	822-3	3US-01-CR5	CT565A	
C10	1000		156186-1	DD-102	801-001	DC-521	
C11	120		156186-3	DD-121	8U-121	UC-3312	
C12	120		156186-3	DD-121	8U-121	UC-3312	
C13	800		156186-8				
C14	800		156186-8				
C15	120		156186-3	DD-121	8U-121	UC-3312	
C16	5-3		156906-5	822-3	3US-01-CR5	CT565A	
C17	10		156186-5				
C18	2.2		156186-5				
C19	5-3		156906-5	822-3	3US-01-CR5	CT565A	
C20	1000		156186-1	DD-102	801-001	DC-521	
C21	1000		156186-1	DD-102	801-001	DC-521	
C22	800		156186-8				
C23	6.2		156186-16				
C24	43		156186-18				
C25	120		156186-3	DD-121	8U-121	UC-3312	
C26	800		156186-8				
C27	1000			DD-102	801-001	DC-521	
C28	1000			DD-102	801-001	DC-521	
C29	5000			DD-502	8U-005	DC-525	
C30	5000			DD-502	8U-005	DC-525	
C31	68	500	C137499-33	DE-680	8U-680		
C32	1000			DD-102	801-001	DC-521	
C33	5000			DD-502	8U-005	DC-525	
C34	5000			DD-502	8U-005	DC-525	
C35	10		D137727-125-1	DE-100	GPIK-100	UC-541	
C36	8		D137727-105	DE-080	GPIK-050	ET-565	
C37	.25	25	A157810-1-1			PT4025	
C38	.1	150	A157906-1-1	DF-104		PT401	
C39	53		D137727-127				
C40	68		D137727-133				
C41	.1	400		DF-104		PT401	
C42	5000			DD-502	8U-005	DC-525	
C43	.01	400		DE-103	GP3-333-103	PT401	
C44	33		D137727-126				
C45	5000			DD-502	8U-005	DC-525	
C46	.01	400		DE-103	GP3-333-103	PT401	
C47	15		D137727-43				
C48	1000			DD-102	801-001	DC-521	
C49	.023	200		DF-203	8U7-03	PT4122	
C50	.023	200		DF-203	8U7-03	PT4122	
C51A	370			GP2K-371		UC-5327	
B	10000		†A157815-1-3	†PC-363	8U-01	DC-511	
C	25				GPIK-250	UC-5425	
C52	.047	200		DF-503		PT4147	

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: AIRLINE PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C53A	5000		*A157812-1-2	*PC-106	8U-005	DC-525	
B	5000				8U-005	DC-525	
C54	.01	400	22K3494	DE-103	GP3-333-103	PT401	
C55	5000			DD-502	8U-005	DC-525	
C56	.047	400		DF-503		PT4147	Note 1
C57	5000			DD-502	8U-005	DC-525	
C58	5000			DD-502	8U-005	DC-525	
C59	20		B137727-81	DE-200	GPIK-200	UC-542	
C60	.047	400		DF-503		PT4147	
C61	.022	200		DF-303	8U7-03	PT4122	
C62	.25	25	A157810-1-1			PT4025	
C63	33		D137727-126				
C64	220	500	C137499-32-1	DE-221	8U-221		
C65	.01	400	22K3494	DE-103	GP3-333-103	PT401	
C66	1200		C144875-33-1				
C67	560		C144875-32-1	DD-561	8U-561	UC-5356	
C68	.047	400		DF-503		PT4147	
C69	63	3000	C158215-32-1	DD30-630			
C70	.068	200	22K3415				
C71	68	3000	C158215-3	DD30-680	EKV-680	DC30468	
C72	1000			DD-102	801-001	DC-521	
C73	1000			DD-102	801-001	DC-521	
C74	5000	1000		DD-502		DC-525	

Note 1 Some versions may use .033MFD in this application. Mfgr. recommends replacement with orig. value.
† Items C51A, C51B, C51C, R50A, R50B, R50C are combined in one unit.
* Items C53A, C53B, R55A and R55B are combined in one unit

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: AIRLINE PART No	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1MEg	½	B157805-1-3	Q11-1361	A47-750K-3†	AB-68†	TA56L†	Vertical Hold (Stop at 350KΩ)
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R1A.
R2A	143kΩ	½	B157802-1-3	Q11-125 ▲	A47-75k-5▲	B-35▲	U-41▲	Horizontal Hold (Stop at 70KΩ)
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	330KΩ	½	B157803-1-2	Q13-133	A47-500K-Z	B-51-S	U-46	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
C	Switch		Not Req.	78-1	SWE-12	Not Req.	U8-26	Attach to R3A.
R4A	1500Ω	½	B157804-1-2	Q17-109	A47-1500-3	AB-51S	U-5	Contrast
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R4A.
R5A	5Meg	½	B157801-1-3	Q17-141	A47-5Meg-3		TA56R	Brightness
B	Shaft		Not Req.	RQ	FKS-1/4		Not Req.	Attach to R5A.
R6A	750Ω	½	B157800-1-1	Q11-105	A47-750-3	AB-5		Vertical Linearity
B	Shaft		Not Req.	TQ	RM-3	AK-19		Attach to R6A.
R7A	5Meg	½	B157806-1-1	Q11-141*	A47-5Meg-3*	AB-56*		Height (Stop at 1Meg
B	Shaft		Not Req.	TQ	RM-3	AK-19		Attach to R7A.
R8	500Ω	2	A157985-2-1		39-500			Buzz (Wire Wound)

† Connect a 350KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
▲ Connect a 70KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down).
* Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down)

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R9	470KΩ	½		BTS-470K	
R10	470KΩ	½		BTS-470K	
R11	15KΩ	½		BTS-15K	
R12	47KΩ	½		BTS-47K	
R13	2200Ω	½			
R14	1000Ω	½		BTS-1000	
R15	470Ω	½			
R16	220KΩ	½			
R17	10KΩ	½			
R18	15KΩ	½			
R19	15KΩ	½			
R20	1000Ω	½		BTS-1000	
R21	27000 5%	½		BTS-2700 5%	
R22	10KΩ	½			Note 1
R23	1000Ω	½		BTS-1000	
R24	47Ω	½		BTS-47	
R25	4700Ω	½		BTS-4700	
R26	1000Ω	½		BTS-1000	
R27	220Ω	½		BTS-220	
R28	1000Ω	½		BTS-1000	
R29	68Ω	½		BTS-68	
R30	12KΩ	½			
R31	1000Ω	½		BTS-1000	
R32	1000Ω	½		BTS-1000	
R33	100Ω	½		BTS-100	
R34	5600Ω	½			
R35	1Meg	½		BTS-1Meg	
R36	1Meg	½			
R37	33KΩ	1			
R38	5600Ω	2			
R39	47Ω	½		BTS-47	
R40	6200Ω	½			
R41	100KΩ	½			
R42	390KΩ	½			
R43	820KΩ	½			
R44	18KΩ	½			
R45	150Ω	½		BTS-150	
R46	470Ω	½		BTS-470	

ITEM No	RATING: OHMS	WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R47	5600Ω	1		BTA-5600	
R48	560KΩ	½		BTS-560K	
R49	470KΩ	½		BTS-470K	
R50A	10KΩ	½			
B	220KΩ	½	†A157813-1-3		
C	2.2Meg	½			
R51	1Meg	½			
R52	47KΩ	½			
R53	6800Ω	½			
R54	4700Ω	½			
R55A	22KΩ	1	* A157812-1-2		
B	10KΩ	1			
R56	7500Ω	2	A156911-4-1		
R57	22KΩ	½			
R58	680Ω	½			
R59	680Ω	½			
R60	560KΩ	½			
R61	100KΩ	½			
R62	1000Ω	½			
R63	27KΩ	½			
R64	2200Ω	½			
R65	150KΩ	½			
R66	100KΩ	½			
R67	150KΩ	½			
R68	150KΩ	½			
R69	2.2Meg	½			
R70	18KΩ	½			
R71	100Ω	½			
R72	4700Ω	½			
R73	12KΩ	2	A156911-5-1		
R74	4700Ω	½			
R75	12MΩ	10	A156230-1-1	1 3/4 A-125	
R76	43Ω	5	A156230-3-1	1 3/4 A-40	
R77	43Ω Hot - 125Ω Cold		A157949-1-1		
R78	7.5Ω	5	B154089-1-6		
R79	33KΩ	1		BTA-33K	

TRANSFORMER (FILAMENT)

ITEM No	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: AIRLINE PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Stancor PART No	Thordarson PART No	Triad PART No
	117VAC	Tap @ 6.3VAC		C157915-1 ①						

① Used in model GSE-4104A.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: AIRLINE PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	Vert. Osc. Trans.	B155255-3-1	B6702	A-3006	V40F	A-8125	26A02	A-97X	
T2	Horiz. Output Trans.	20E995	FB418*	HVO-37*	X023*	A-8262*	FLY-25*	D-48*	
T3	Vert. Output Trans.	32E97		A-2824					
T4A	Yoke (90°) Horiz. (20MM)	AD158436-1-2	DF80T①	MDF-98①	235D①		DY-16A ②	Y-16 ②	Y-41 ②
B	Vert. (40MM)								

① Use original rear cover and centering device.
② Use original horizontal damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
7	H. V. Rect. Plate Lead	7		7	7	H V Rect. Plate Lead	
6	6	6		6	6	6	6
3	3	3		3	3	3	3
5	5	5		5	5	5	5
2	2	2		2	2	2	2
Connect Width Coil Across →							
Special Notes →							

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: AIRLINE PART No.	Halldorson PART No	Merit PART No	Stancor PART No.	Thordarson PART No	Triad PART No	NOTES
T5	2KΩ	3.5Ω	B157919-1-1	Z1101	A-3025	A-3332	26S586 1	S-12X	1 Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: AIRLINE PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.5Ω	C157896-1-3 AD-157896-1-1 ①	4A07	① Alternate 4" PM Speaker.

COILS (RF-IF)

ITEM No.	USE	DC RES: PRI.	SEC.	REPLACEMENT DATA: AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0ΩCT	0Ω	158021-2				Channel 2
B	Ant. Coil	0ΩCT	0Ω	158021-3				Channel 3
C	Ant. Coil	0ΩCT	0Ω	158021-4				Channel 4
D	Ant. Coil	0ΩCT	0Ω	158021-5				Channel 5
E	Ant. Coil	0ΩCT	0Ω	158021-6				Channel 6
F	Ant. Coil	0ΩCT	0Ω	158021-7				Channel 7
G	Ant. Coil	0ΩCT	0Ω	158021-8				Channel 8
H	Ant. Coil	0ΩCT	0Ω	158021-9				Channel 9
I	Ant. Coil	0ΩCT	0Ω	158021-10				Channel 10
J	Ant. Coil	0ΩCT	0Ω	158021-11				Channel 11
K	Ant. Coil	0ΩCT	0Ω	158021-12				Channel 12
L	Ant. Coil	0ΩCT	0Ω	158021-13				Channel 13
L2A	RF, Mixer Grid, Osc. Coils	0Ω		158023-2				Channel 2
B	RF, Mixer Grid, Osc. Coils	0Ω		158023-3				Channel 3
C	RF, Mixer Grid, Osc. Coils	0Ω		158023-4				Channel 4
D	RF, Mixer Grid, Osc. Coils	0Ω		158023-5				Channel 5
E	RF, Mixer Grid, Osc. Coils	0Ω		158023-6				Channel 6

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
F	RF, Mixer Grid, Osc. Coils	0Ω		158022-7				Channel 7
G	RF, Mixer Grid, Osc. Coils	0Ω		158022-8				Channel 8
H	RF, Mixer Grid, Osc. Coils	0Ω		158022-9				Channel 9
I	RF, Mixer Grid, Osc. Coils	0Ω		158022-10				Channel 10
J	RF, Mixer Grid, Osc. Coils	0Ω		158022-11				Channel 11
K	RF, Mixer Grid, Osc. Coils	0Ω		158022-12				Channel 12
L	RF, Mixer Grid, Osc. Coils	0Ω		158022-13				Channel 13
L3	Fil. Choke	0Ω		156906-51				
L4	RF Choke	0Ω		156906-52				
L5	Conv. Plate	.7Ω		158106-11				
L6	1st Video IF	.3Ω		AA157787-1-5	17-1003	TV-102	6171A	
L7	2nd Video IF	.4Ω	.2Ω	20E994	17-1004	TV-102	6250	
L8	Fil. Choke	0Ω		AB155256-1-1	19-1000		4602	1.2 Microhenries
L9	3rd Video IF	.4Ω	.4Ω	B158224-1-3	17-1006		6253	Includes 21.9MC Trap
L10	4th Video IF	.3Ω	.5Ω	B158355-1-4	17-1001*	TV-100*	6251	
L11	Series Peaking Coil	2.4Ω		B158352-1-1	19-1006		4624	16 Microhenries
L12A	4.5MC Trap	2.8Ω						
B	1st Sound IF	.8Ω		B158353-1-2				
L13	Shunt Peaking Coil	19Ω		B158222-1-1	19-3660■		4651■	685 Microhenries, Wound on 4.7KΩ resistor
L14	Series Peaking Coil	9.5Ω		B158223-1-1	19-4201▲	TV-184▲	6154▲	210 Microhenries, Wound on on 27KΩ resistor
L15	2nd Sound IF	1.8Ω	3.5Ω	B158354-1-2				
L16	Quadrature Coil	4.8Ω		B158351-1-2	20-1005	TV-151	1480	
L17	Horiz. Osc.	28Ω	60Ω	C158225-1-2	20-1402	TV-162	6183	Waveform Winding=46Ω

*Detune trap
■ Parallel with 4.7KΩ resistor
▲ Parallel with 27KΩ resistor

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L18	.180ADC	52Ω	1.2HY	B155529-2 B155529-1-1 ②	C5040	C-2994	C-2327	26C41	C-21X ①

① Drill one new mounting hole.
② Alternate filter choke.

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: AIRLINE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.180A	C155575-2-1	1028A	RS250	6S250	5Q1	250A	
M2	.180A	C155575-2-1	1028A	RS250	6S250	5Q1	250A	

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Tuner	D-157282-1	VHF
M4	Tuner		UHF-Model GSE-4104A only.
M5	Switch	B157867-1-2	VHF-UHF-Model GSE 4104A only.
M6	Centering device		Part of deflection yoke rear cover (T4).
M7	Ion Trap	B153109-2-3	
B3	Trimmer Cap.	A157870-1-1	Horiz. Lock (10-160MMF)
	Knob	37E95	VHF Channel Selector-Model GSE-4006A
	Knob	37E95-2	VHF Channel Selector-Models GSE-4004A, GSE-4104A
	Knob	37E94	Fine Tuning
	Knob	37E93	Horiz. Hold, Vert. Hold, Contrast, & on-off-Volume
	Knob	37E95-3	UHF Channel Indicator-Model GSE-4104A
	Knob	D158359-1-1	UHF Tuning-Model GSE-4104A
	Knob	37E93-2	VHF-UHF Switch-Model GSE-4104A
	Safety Glass	9E50-4	Models GSE-4004A, GSE 4104A
	Safety Glass	9E50-5	Model GSE-4006A
	Mask	36E101-3	Model GSE-4006A
	Mask	36E102-2	Models GSE-4004A, GSE 4104A

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. I. SOUNDSHIP
[illegible] MAIN ST.
[illegible], COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V11, V12, V13 and V14. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T2, T4A, C69, C68, C70, R73 and other associated components.	Check L17, C60, C61, C64, C65, C67, R61, R63, R70 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V12 and V13. Check M1 and M2. Check C1, C66, C67, R73, R78, R77, T2 and other associated components.

BLOOMING

Check by substitution V12, V13 and V14. Check M1 and M2. Check C67, R73, R78 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO PICTURE, NO SOUND

Check by substitution V1, V2, V3, V4, V5, V6 and V9. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

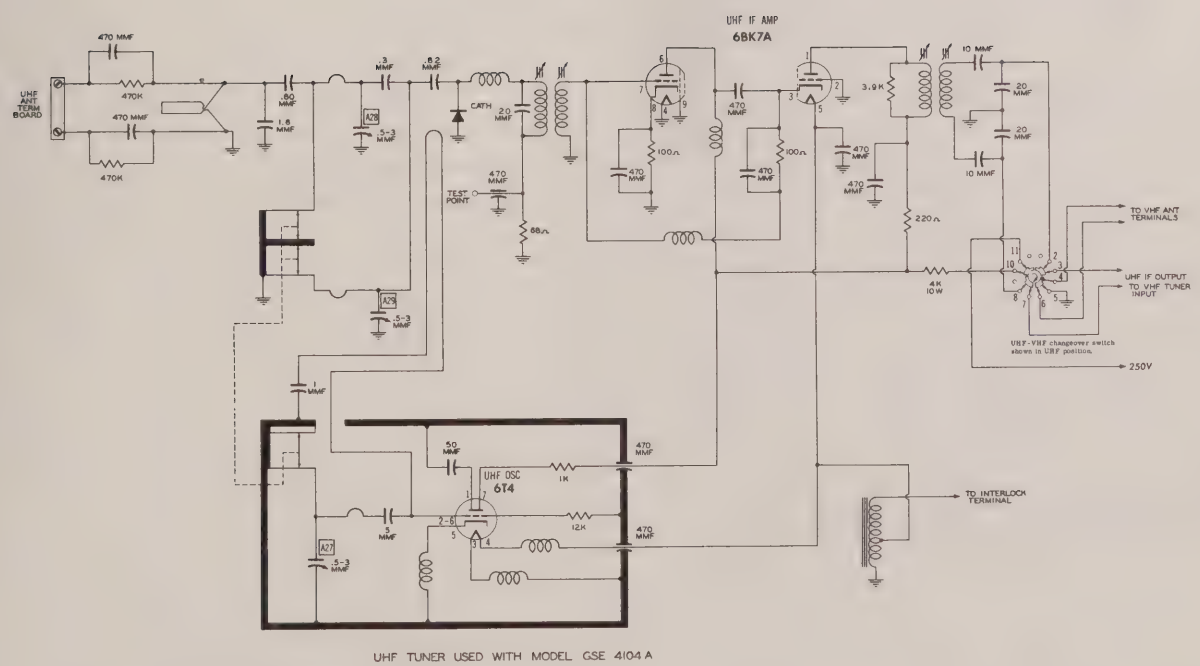
KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF TUNER USED WITH MODEL GSE 4104 A

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UHF TUNER SCHEMATIC

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding wood strip at the bottom of the safety glass. Remove wood strip and safety glass. Use extreme catuion when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See cabinet (rear view) on page 11.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of the chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug of L17 until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, it is necessary to remove the rear cover and supply power to set. Adjust the buzz control (R8) for maximum volume and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type control knobs from side panel of cabinet.
2. Remove 5 wood screws. Remove rear cover.
3. Remove 1 wood screws. Remove antenna terminal bracket.
4. Disconnect speaker leads.
5. Place cabinet face down on a soft surface.
6. Remove ONLY the 4 cabinet mounting screws at the outer edges of the cabinet base. Remove 2 wood screws from the 2 corner support braces and 2 wood screws at the front bottom of the cabinet.
7. Guide cabinet to its normal upright position and lift cabinet straight up and off of chassis mounting board.
8. Remove 2 speaker nuts. Remove speaker.

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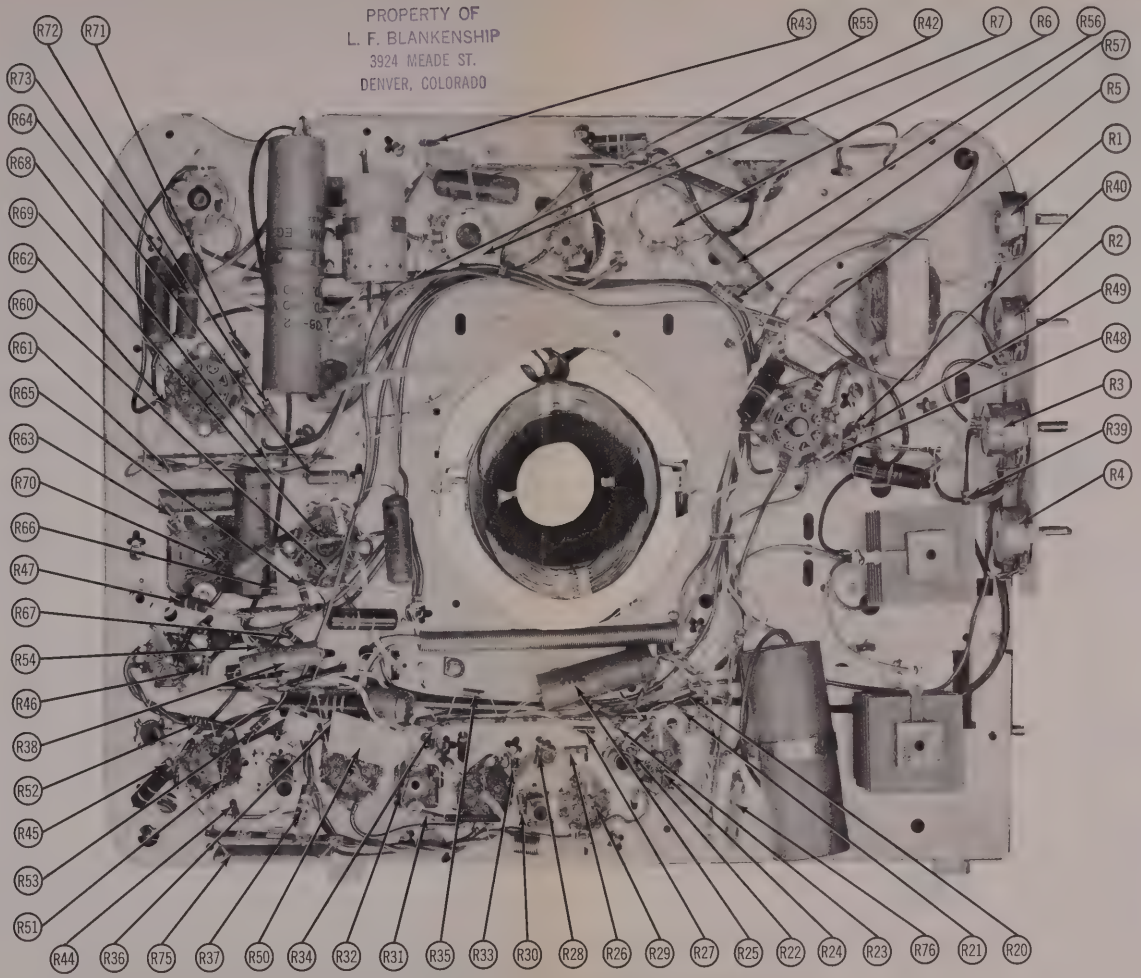

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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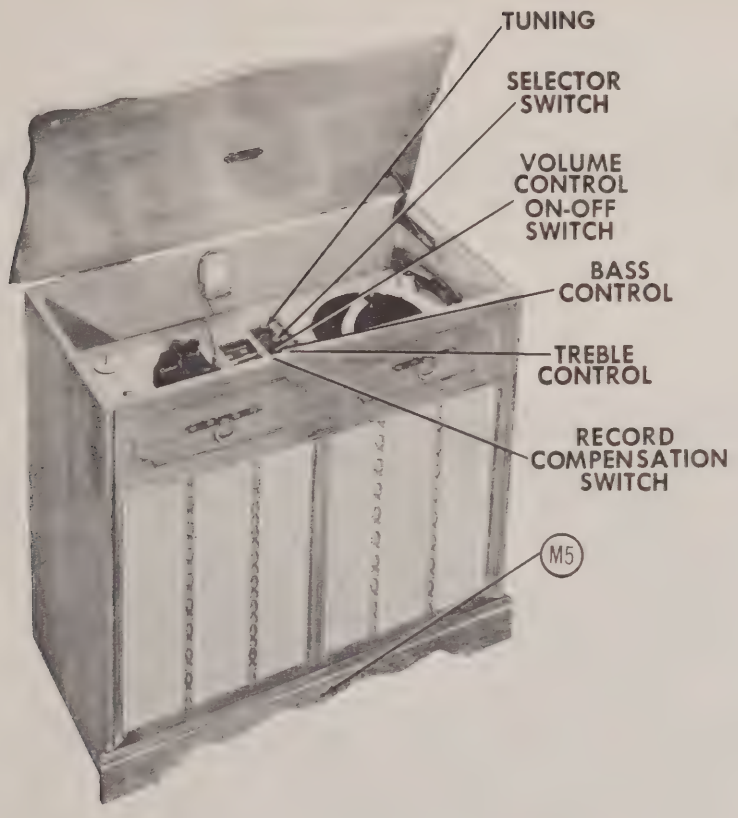
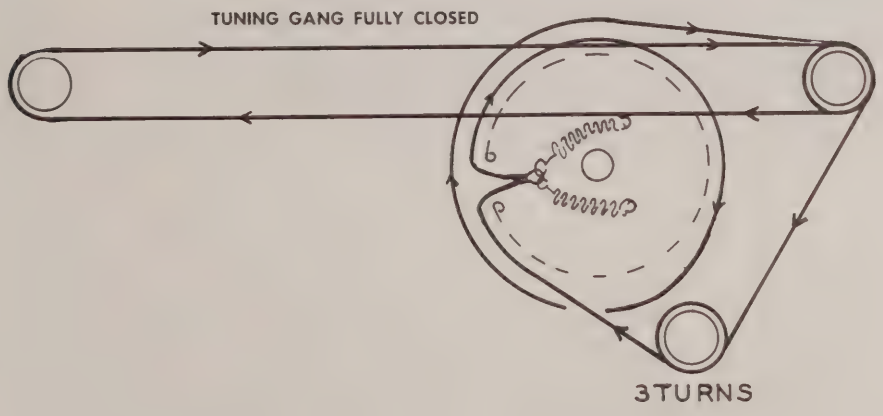


CAPEHART MODEL 17RPQ155F
(Ch. CR-200 & CA-199)

CAPEHART MODEL 17RPQ155F
(Ch. CR-200 & CA-199)

TRADE NAME	Capehart Model 17RPQ155F (Radio Ch. CR-200 & Amp Ch. CA-199)		
MANUFACTURER	Capehart-Farnsworth Corp., Fort Wayne, Ind.		
TYPE SET	AC Operated Combination AM-FM Radio-Phonograph and Tape Recorder		
TUBES	Eleven		
POWER SUPPLY	105-120 Volts AC-60 Cycles	RATING	.82 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540KC-1620KC	FREQUENCY MODULATION	88MC-108MC

DIAL CORD STRINGING



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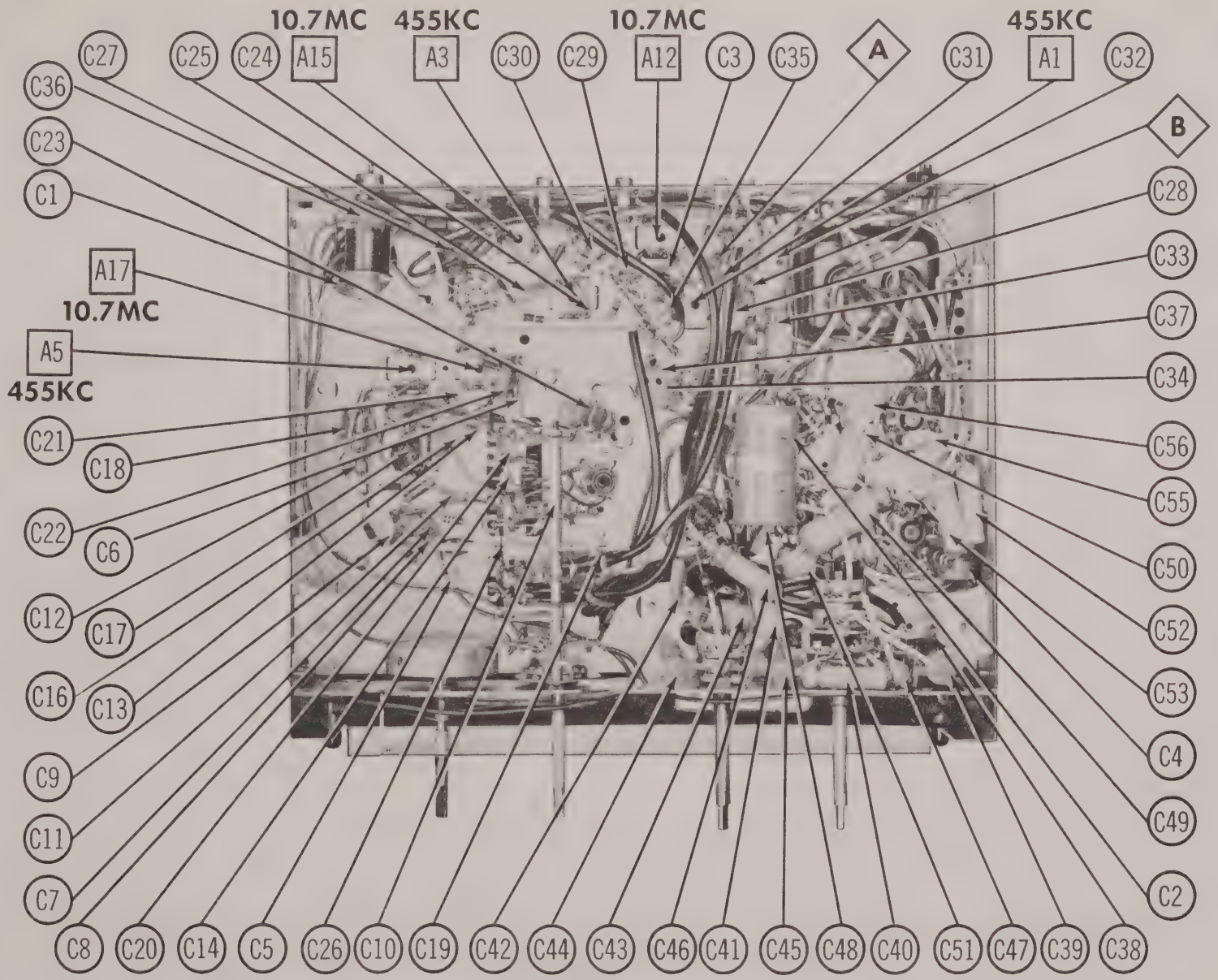
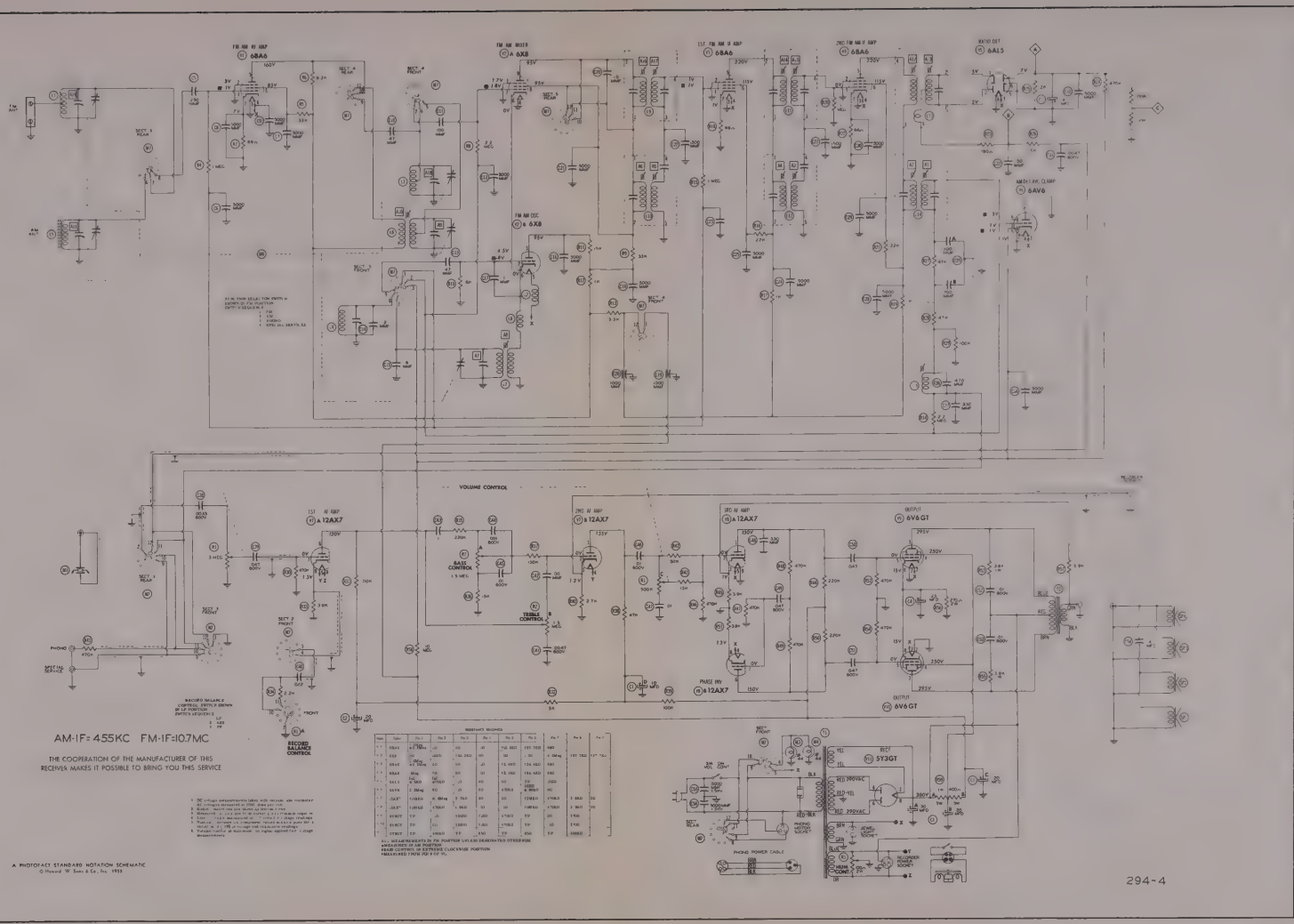


CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION


AM-IF= 455KC FM-IF=10.7MC
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTO-FACT STANDARD NOTATION SCHEMATIC
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294-4

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CAPEHART
Model 17RPQ1555F

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Direct	High side to green coded lug on AM RF coil (L7). Low side to chassis.	455KC (400% Mod)	AM	Tuning gang fully open.	Across speaker output terminals.	A1, A2, A3, A4 A5, A6	Adjust for maximum output.
2.	"	"	1620KC	"	"	"	A7	"
3.	"	"	537KC	"	Tuning gang fully closed.	"	A8	"
4.	"	High side to antenna stator lug (AM). Low side to chassis.	1500KC	"	Tune to 1500KC signal	"	A9	"
5.	"	"	600KC	"	Tune to 600KC signal.	"	A10	
6.		Loop	1500KC	"	Tune to 1500KC signal	"	A11	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (A) to chassis. The junction of these two resistors is alignment point (B) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	10.7MC (Unmod)	FM	Tuning gang fully open	DC probe to point (A). Common to chassis.	A12	Adjust for maximum deflection.
8.	"	"	"	"	"	DC probe to point (B). Common to point (C).	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
9.	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	DC probe to point (A). Common to chassis.	A14, A15	Adjust for maximum deflection.
10.	"	High side to pin 1 (grid) of 6BA6 (V1). Low side to chassis.	"	"	"	"	A16, A17	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	10.7MC (450KC Swp)	FM	Tuning gang fully open	Vert. Amp. to point (A). Low side to chassis.	A12	Disconnect stabilizing capacitor (C4) Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
8.	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	"	A14, A15	"
9.	"	High side to pin 1 (grid) of 6BA6 (V1). Low side to chassis.	"	"	"	"	A16, A17	"
10.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A13	Reconnect stabilizing capacitor (C4). Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A12 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
11.	Direct	High side to FM antenna stator lug. Low side to chassis.	108.5MC (Unmod)	FM	Tuning gang fully open	DC probe to point (A). Common to chassis.	C14	Reposition C14 nearer or farther from chassis until maximum deflection is obtained on VTVM.
12.	"	"	105MC	"	Tune to 105MC signal	"	A18	Adjust for maximum deflection.
13.	"	"	87.5MC	"	Tuning gang fully closed	"	L2	Adjust for maximum deflection by compressing or expanding L2. Repeat steps 11, 12 and 13 for proper tracking.
14.	Two 120Ω Carbon Resistors	Across FM antenna terminals with 120Ω in each lead.	105MC	"	Tune to 105MC signal	"	A19	Adjust for maximum deflection.
15.	"	"	90MC	"	Tune to 90MC signal	"	L1	Adjust for maximum deflection by crompressing or expanding L1. Repeat steps 14 and 15 for proper RF tracking and maximum sensitivity.

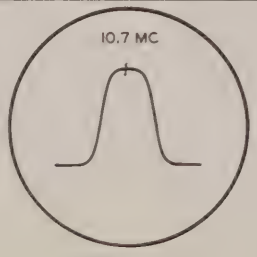


FIG. 1

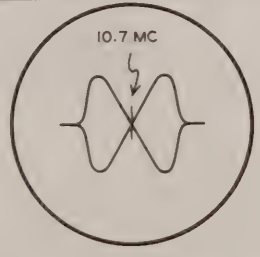


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CAPEHART PART No.	STANDARD REPLACEMENT		
V1	FM AM RF Amp.	6BA6	6BA6	7BK	
V2	FM AM Mixer-Osc.	6X8	6X8	9AK	
V3	1st FM AM IF Amp	6BA6	6BA6	7BK	
V4	2nd FM AM IF Amp	6BA6	6BA6	7BK	
V5	Ratio Detector	6AL5	6AL5	6BT	
V6	AM Det. -AVC Clamp	6AV6	6AV6	7BT	
V7	1st AF Amp. - 2nd AF Amp.	12AX7	12AX7	9A	
V8	3rd AF Amp. - Phase Inverter	12AX7	12AX7	9A	
V9	Audio Output	6V6GT	6V6GT	7S	
V10	Audio Output	6V6GT	6V6GT	7S	
V11	Rectifier	5Y3GT	5T	5T	

ELECTROLYTIC CAPACITORS

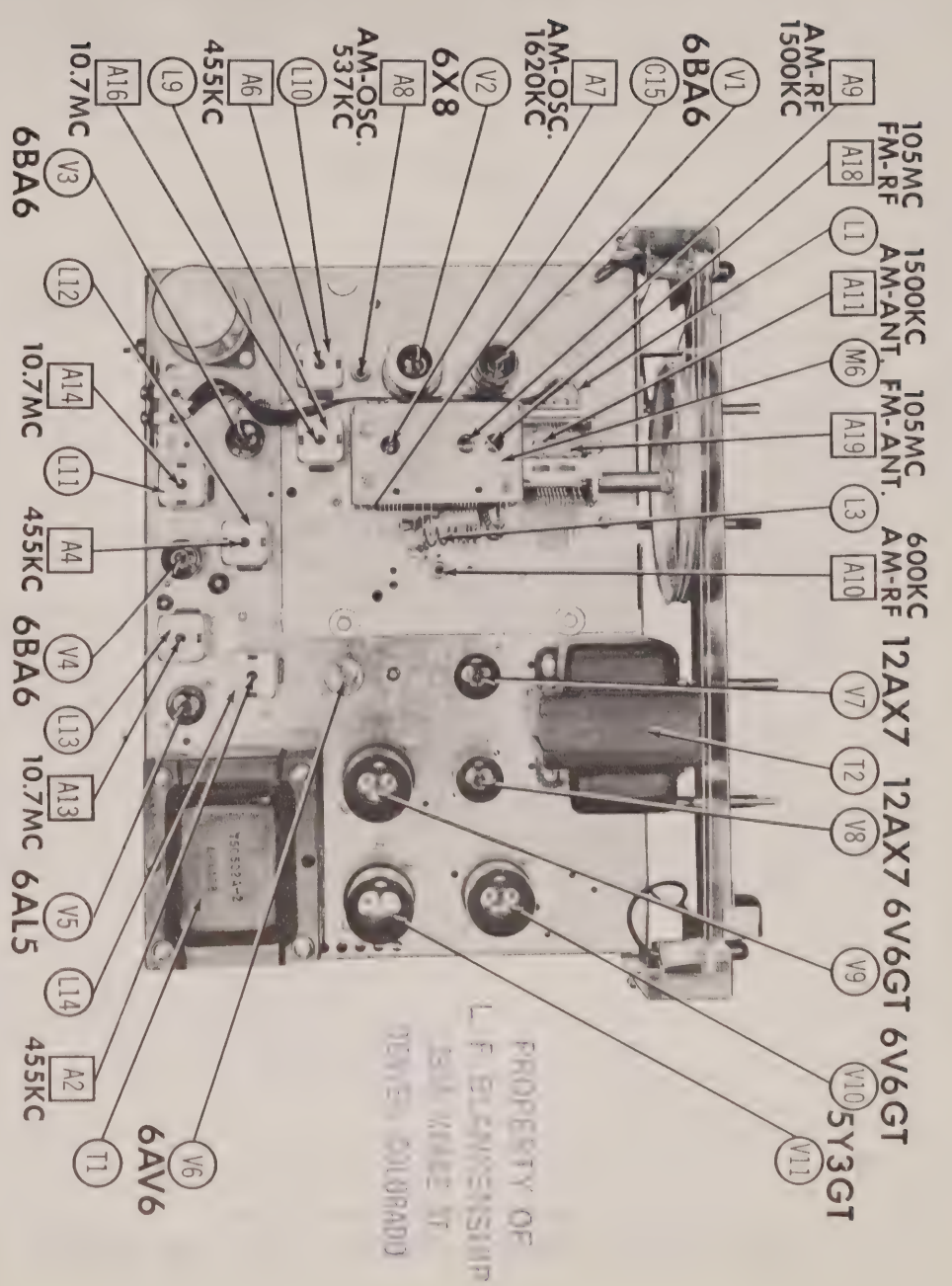
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CAPEHART PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▪30	450	750090B-43	FP444.5	TM-4048	Q-050	
B	■20	450					
C	▲20	450					
D	10	450					
C2	20	450	650228A-12	TC75	TD-20-450	FM-4520	
C3	4	50	650228A-14	TC30	TD-4-50	FM-1504	
C4	25	25	650228A-7	TC26	TD-25-25	FM-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	CAPEHART PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C5	250		450469A-9	DD-251	811-251	UC-5325	
C6	5000		450469A-1	DD-502	811-005	DC-525	
C7	5000		450469A-1	DD-502	811-005	DC-525	
C8	5000		450469A-1	DD-502	811-005	DC-525	
C9	5000		450469A-1	DD-502	811-005	DC-525	
C10	47		2271-0678	TCN-47	N750K-470	NT-5447	
C11	100		2271-0686	TCN-100	N750L-101	NT-531	
C12	5000		450469A-1	DD-502	811-005	DC-525	
C13	47		2271-0678	TCN-47	N750K-470	NT-5447	
C14	12		2271-5599				
C15	6		2271-9407				
C16	5000		450469A-1	DD-502	811-005	DC-525	
C17	1		650501A-27	TCZ-1	NP0A-010		
C18	5000		450469A-1	D6-180	811-005	DC-525	
C19	1000		650716A-1	MFT-1000			
C20	10						
C21	5000		450469A-1	DD-502	811-005	DC-525	
C22	1500	500	750272A-35				
C23	.1	200	2246-1030	DF-104		PT401	
C24	5000		450469A-1	DD-502	811-005	DC-525	
C25	5000		450469A-1	DD-502	811-005	DC-525	
C26	1000		650716A-1	MFT-1000			
C27	1500	500	750272A-35				
C28	5000		450469-1	DD-502	811-005	DC-525	
C29	5000		450469-1	DD-502	811-005	DC-525	
C30	5000		450469-1	DD-502	811-005	DC-525	
C31	5000		450469A-1	DD-502	811-005	DC-525	
C32	150	500	650162A-8	TCZ-150	NP0-334-151	MCB236	
C33	.0047	600	2248-4720	D6-472	GP2-333-472	PT6247	
C34	5000		450469A-1	DD-502	811-005	DC-525	
C35A	100		♦452171A-1	♦PC-50	♦1403-01	UC-531	
B	100					UC-531	
C36	470	500	750272A-39				
C37	330	500	650162A-9				
C38	.0033	600	2248-3320	D6-332	GP2-333-332	PT623	
C39	.047	600	2248-4730	DF-503		PT6147	
C40	.022	200	2246-2230	DF-203	817-02	PT4122	
C41	.0047	600	2248-4720	D6-472	GP2-333-472	PT6247	
C42	100	500	750272A-11	TCZ-101	NP0-337-101	MCB235	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT.	REPLACEMENT DATA CAPEHART PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C43	.1	400	2247-1040	DF-104		PT401	
C44	.001	600	2248-1020	D6-102	GP2L-102	PT621	
C45	.01	600	2248-1030	D6-103	GP3-333-103	PT611	
C46	.01	600	2248-1030	D6-103	GP3-333-103	PT611	
C47	.01	200	2246-1030	D6-103	GP3-333-103	PT611	
C48	330	500	650162A-9				
C49	.047	600	2248-4730	DF-503		PT6147	
C50	.047	400	2248-4730	DF-503		PT4147	
C51	.047	600	2248-4730	DF-503		PT6147	
C52	.01	600	2248-1030	D6-103	GP3-333-103	PT611	
C53	.01	600	2248-1030	D6-103	GP3-333-103	PT611	
C54	4	50	650663A-3				
C55	5000	1500	453521A-1	DD16-502	1R5KV-472	PT625	
C56	5000	1500	453521A-1	DD16-502	1R5KV-472	PT625	

♦ Items C35A, C35B and R27 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	Switch		650986C-1					Record Balance
B	3Meg	½						Volume (Front Section)
C	500KΩ	½						Volume & Switch (Rear)
R2A	1.5Meg	½	750303A-7	QJ-792R ♦				Bass (Panel)
B	1.5Meg	½						Treble (Rear)
R3	100Ω	2	650642A-6		39-100			Hum Adj. (wirewound)

♦ CONCENTRIKIT EQUIVALENT: K-7 KIT, BASE ELEMENTS AND SHAFTS: B13-138, P14-206 (Panel) B13-138, R2-216 (Rear)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	NOTES
R4	1Meg	½	3230-105	BTS-1Meg	
R5	33KΩ	½	3230-333	BTS-33K	
R6	8200Ω	½		BTS-8200	
R7	68Ω	½	3229-680	BTS-68	
R8	2.2Meg	½	3230-225	BTS-2.2Meg	
R9	33KΩ	½	3230-333	BTS-33K	
R10	18KΩ	½	3229-183	BTS-18K	
R11	15KΩ	½	3229-153	BTS-15K	
R12	1000Ω	½	3230-102	BTS-1000	
R13	3300Ω	½	3229-322	BTS-3300	
R14	2.2Meg	½	3230-225	BTS-2.2Meg	
R15	1Meg	½	3230-105	BTS-1Meg	
R16	22KΩ	½	3229-223	BTS-22K	
R17	1000Ω	½	3230-102	BTS-1000	
R18	68Ω	½	3229-680	BTS-68	
R19	1000Ω	½	3230-102	BTS-1000	
R20	1Meg	½	3230-105	BTS-1Meg	
R21	22KΩ	½	3229-223	BTS-22K	
R22	68Ω	½	3229-680	BTS-68	
R23	180Ω	½	3229-181	BTS-180	
R24	470KΩ	½	3230-474	BTS-470K	
R25	12KΩ	½	3229-123	BTS-12K	
R26	15KΩ	½	3229-153	BTS-15K	
R27	47KΩ	½	♦452171A-1	BTS-47K	
R28	47KΩ	½	3230-473	BTS-47K	
R29	100KΩ	½	3230-104	BTS-100K	
R30	470KΩ	½	3230-474	BTS-470K	
R31	100KΩ	½	3230-104	BTS-100K	
R32	15KΩ	½	3229-153	BTS-15K	
R33	3900Ω 5%	½	3228-392	BTS-3900 5%	
R34	2200Ω	½	3229-222	BTS-2200	
R35	220KΩ	½	3229-224	BTS-220K	
R36	15KΩ	½	3229-153	BTS-15K	
R37	150KΩ	½	3229-154	BTS-150K	
R38	47KΩ	½	3230-473	BTS-47K	
R39	100KΩ	½	3230-104	BTS-100K	
R40	2700Ω 5%	½	3228-272	BTS-2700 5%	
R41	470KΩ	½	3230-474	BTS-470K	
R42	150KΩ	½	3229-154	BTS-150K	
R43	15KΩ	½	3229-153	BTS-15K	
R44	220KΩ	½	3229-224	BTS-220K	
R45	3900Ω 5%	½	3228-392	BTS-3900 5%	
R46	470KΩ	½	3230-474	BTS-470K	
R47	470KΩ	½	3230-474	BTS-470K	
R48	470KΩ 5%	½		BTS-470K 5%	
R49	470KΩ 5%	½		BTS-470K 5%	
R50	220KΩ	½	3229-224	BTS-220K	
R51	3900Ω 5%	½	3228-392	BTS-3900 5%	
R52	470KΩ	½	3230-474	BTS-470K	
R53	3900Ω	1	3229-392	BTA-3900	
R54	470KΩ	½	3230-474	BTS-470K	
R55	3900Ω	1	3229-392	BTA-3900	
R56	270Ω 5%	2	3234-271	BTB-270 5%	
R57	3900Ω 5%	½	3228-392	BTS-3900 5%	
R58	10Meg	½	3229-106	BTS-10Meg	
R59A	1000Ω	5	†750288A-8	PW7-1000	
B	400Ω	5			

♦ Items C35A, C35B, R27 are combined in one unit.
† Items R59A, R59B are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA CAPEHART PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.82A	580VCT .104ADC	5VAC @ 2A	6.3VAC @.36A SEC. 4 6.3VAC @3.7A	750502A-2					

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA CAPEHART PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6KΩCT	3.1Ω	750503B-1				22S97		

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA CAPEHART PART No.	QUAM PART No.	NOTES
SP1	5"	PM	3.3Ω	850275A-2		
SP2	5"	PM	3.3Ω	850275A-2		
SP3	12"	PM	7.5Ω	850123A-6	12A10X	
SP4	12"	PM	7.7Ω	850315A-1		

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA CAPEHART PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω		453383A-1				Tapped
L2	Fil. Choke	.1Ω		452864A-1	19-1003		4608	4 Microhenries
L3	FM RF Coil	0Ω		453382A-1				Tapped
L4	FM Osc. Coil	0Ω		453379B-1				
L5	AM Ant. Coil	.8Ω		650664B-2				
L6	AM RF Coil	3.9Ω	3.5 *	650727B-1	14-1076			*Tapped @ 2.3Ω
L7	AM Osc. Coil	.9Ω	5.3Ω	650729A-1	14-1074	BC-381	71-OSC	
L8	RF Coil	.1Ω		452864A-1	19-1003		4608	4 Microhenries
L9	1st. FM IF	.7Ω	.7Ω	452027A-1	16-3487	FM-254	1463	
L10	1st. AM IF	1Ω		452019A-1	16-6758 ■	BC-352 ■	12-C1 ■	
L11	2nd. FM IF	.7Ω	.7Ω	452027A-1	16-3487	FM-254	1463	
L12	2nd. AM IF	1Ω		452019A-1	16-6758 ■	BC-352 ■	12-C1 ■	
L13	Ratio Det.	4.6Ω	1.4ΩCT	453721A-1	17-3498	FM-255	1465	Tertiary winding-.4Ω
L14	3rd. AM IF	9Ω	9Ω	450336A-1	16-6758	BC-353	12-C2	
L15	10KC Filter	400Ω		650811A-1				

■ Disconnect 1500MMF capacitor across secondary winding.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA CAPEHART PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1		55-T	GD-J	47	0-1 or S-1 & 0-3	

ASTATIC AND ELECTRO-VOICE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA CAPEHART PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		*S-67 or †S-66 or ♦†S-66SD or ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M3	Dial Light	600093A-5	#44
M4	Dial Light	600093A-5	#44
M5	Jewel Light		#47
M6	Tuning Cap.	750413A-1	3 Gang (20-340MMF, 24-300MMF, 22-165MMF)
M7	Switch	750620B-1	Selector (Rotary - wafer type)
	Knob	650856A-6	On-off-volume and treble
	Knob	650855A-6	Record Balance and bass
	Knob	650994A-1	Tuning & selector switch

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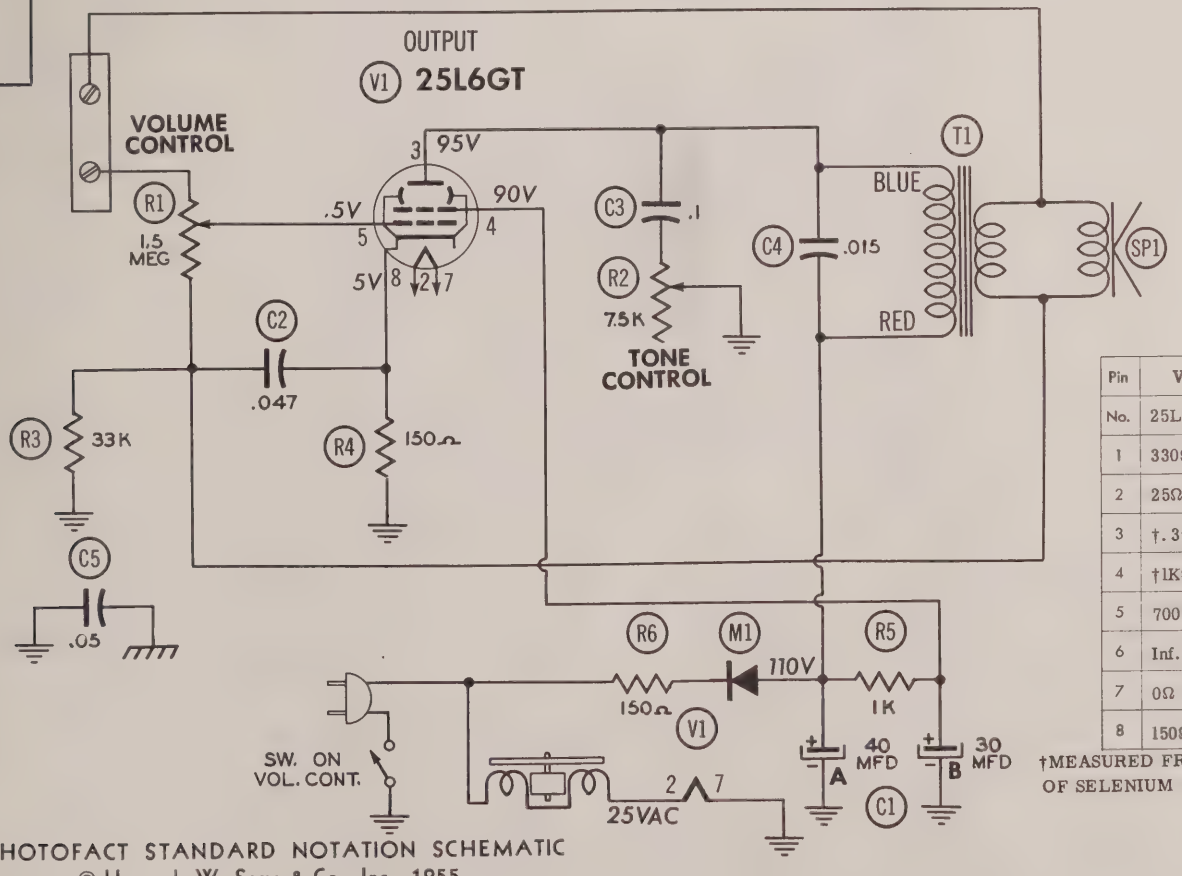
COLUMBIA RECORDS
MODEL 200

TRADE NAME	Columbia Records Model 200
MANUFACTURER	Columbia Records, 799 Seventh Ave., New York 19, N. Y.
TYPE SET	AC Operated Phono Amplifier with 3 Speed Manual Record Player
TUBES (One)	Type 25L6GT Audio Amplifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.32 Amp. @ 117 Volts AC



Pin No.	V1 25L6GT
1	330Ω
2	25Ω
3	†.36Ω
4	†1KΩ
5	700KΩ
6	Inf.
7	0Ω
8	150Ω

†MEASURED FROM OUTPUT OF SELENIUM RECTIFIER.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		COLUMBIA PART No.	STANDARD REPLACEMENT		
V1	Output	25L6GT	25L6GT	7S	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	COLUMBIA PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	150		TCD48	TDL-5030-150	FMD-301	
B	30	150					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	COLUMBIA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.047	400		DF-503		PT4147	
C3	.1	200		DF-104		PT401	
C4	.015	200				PT4115	
C5	.05	400		DF-503		PT415	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	COLUMBIA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1.5Meg	½	6162413	Q11-138	A47-1.5Meg-S	AB-69	U-155	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A.
R2A	7500Ω	½	BA011-1292	Q11-115	A47-7500-S	AB-13	U-20	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	COLUMBIA PART No.	IRC PART No.	
R3	33KΩ	½		BTS-33K	
R4	150Ω	½		BTS-150	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	COLUMBIA PART No.	IRC PART No.	
R5	1000Ω	½		BTS-1000	
R6	150Ω	1			

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	COLUMBIA PART No.	QUAM PART No.	
SP1	4"	PM	3.5Ω		4A1	

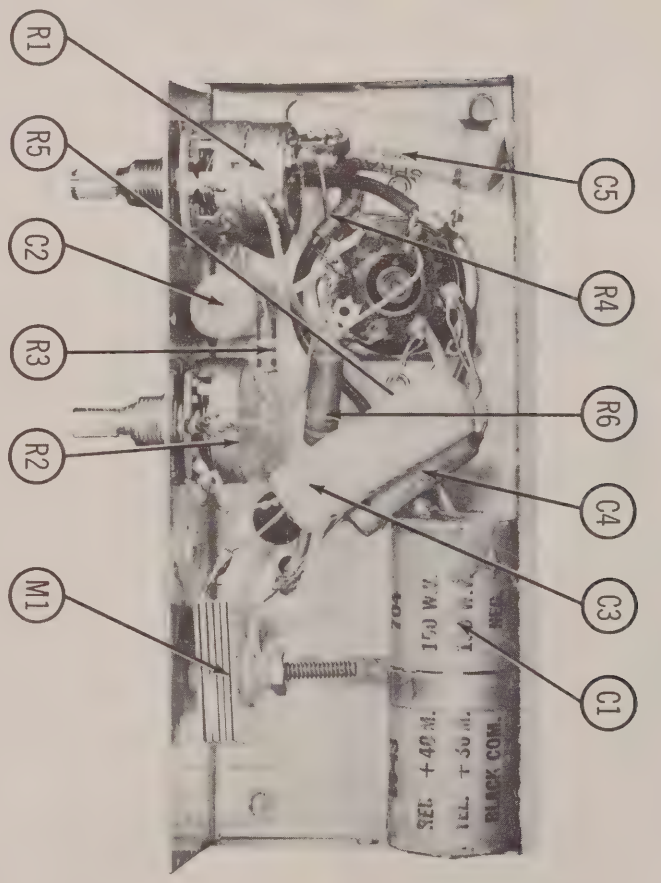
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	COLUMBIA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.2KΩ	3.5Ω		Z1101	A-3025	A-3332	24S50①	S-12X	① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	COLUMBIA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.052A		1263A	RS-65	6865	65	8J1	

CHASSIS—BOTTOM VIEW



PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	COLUMBIA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2		18L3 *P-18L3	M-202	60 *2460		

* Complete tone arm and cartridge assembly.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	COLUMBIA PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M3		*J-152	†B-450 or ♦B-450D	†WS-400-2	* Metal † Jewel ♦ Diamond

PHOTOFACT* Folder

FIRESTONE MODEL
13-G-183 (Code 280-5-21T26)

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FIRESTONE MODEL
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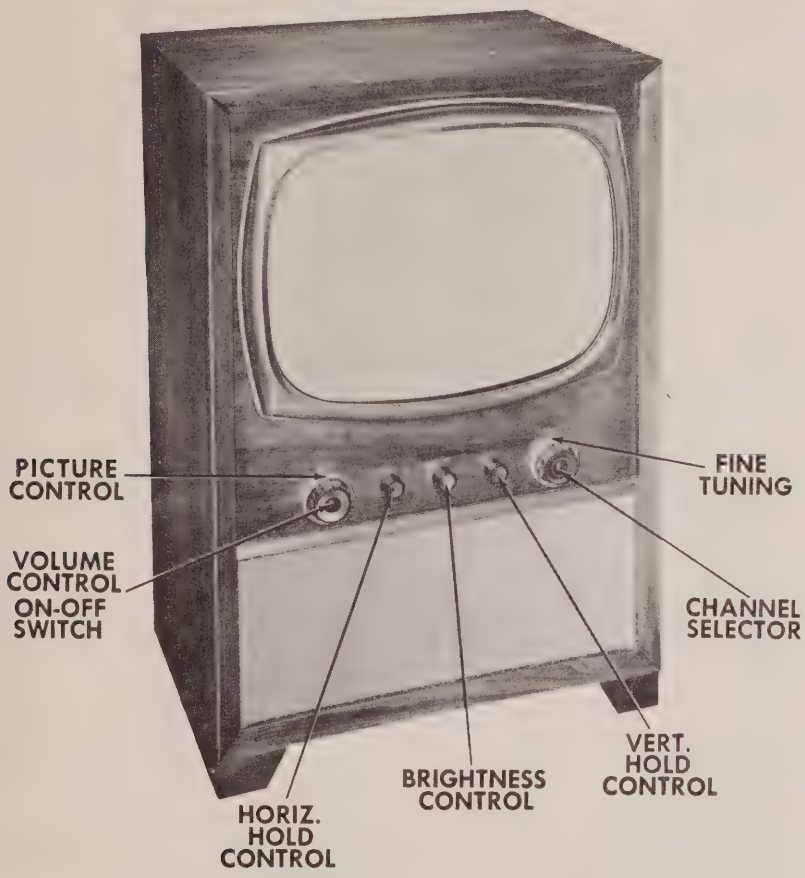

FIRESTONE MODEL 13-G-183 (Code 280-5-21T26)

TRADE NAME	Firestone Model 13-G-183 (Codes 280-5-21T20, 280-5-21T26)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio
TYPE SET	Television Receiver
TUBES	Fifteen

POWER SUPPLY 105-115 Volts AC-60 Cycles RATING 1.36 Amp. @ 115 Volts AC
TUNING RANGE Channels 2 thru 13, Video IF 26.75MC, Sound IF 22.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 19, 20
Photographs (Con't)
Trans., Inductor & Alignment Identification 13
Production Changes 17
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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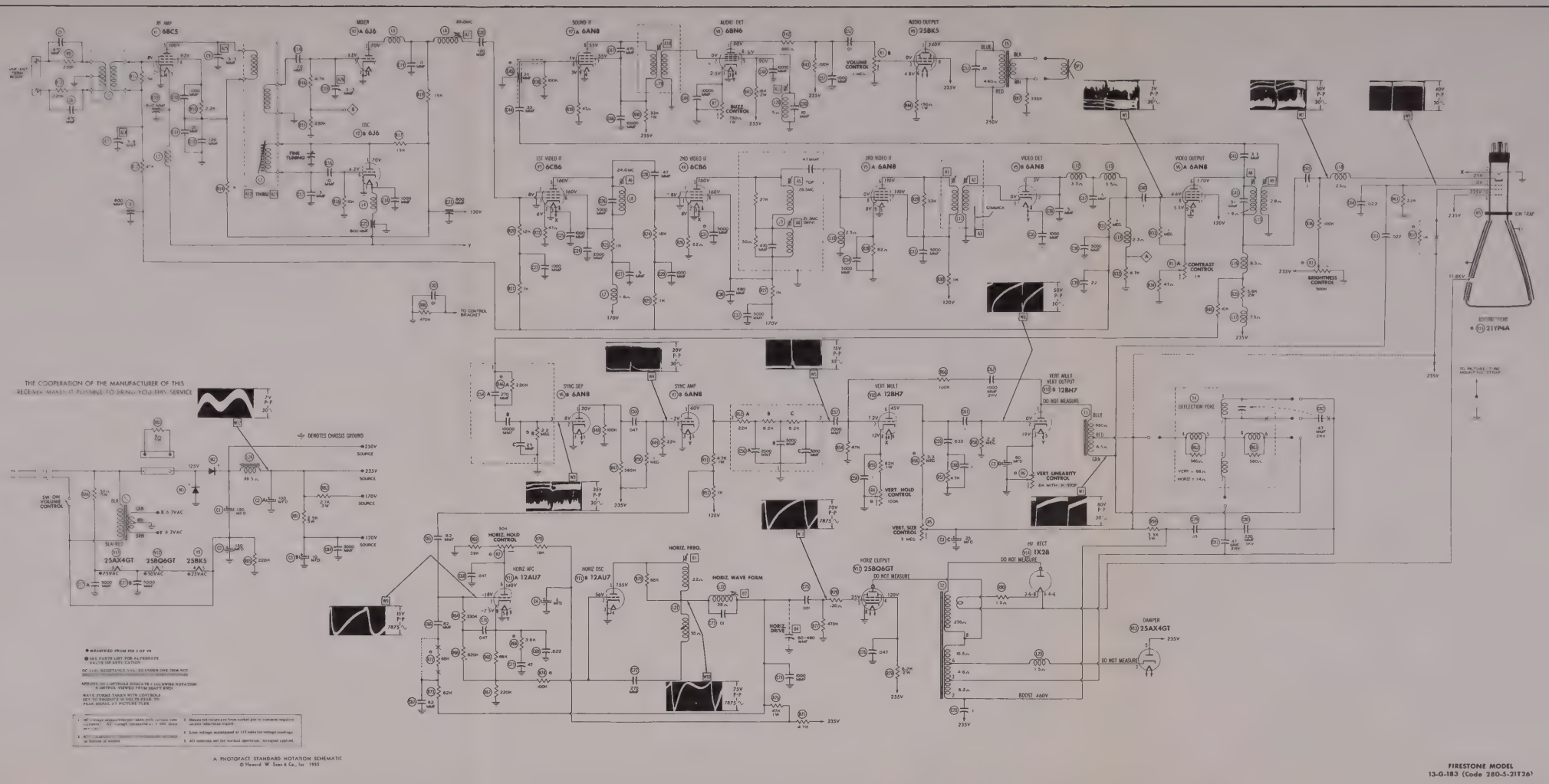
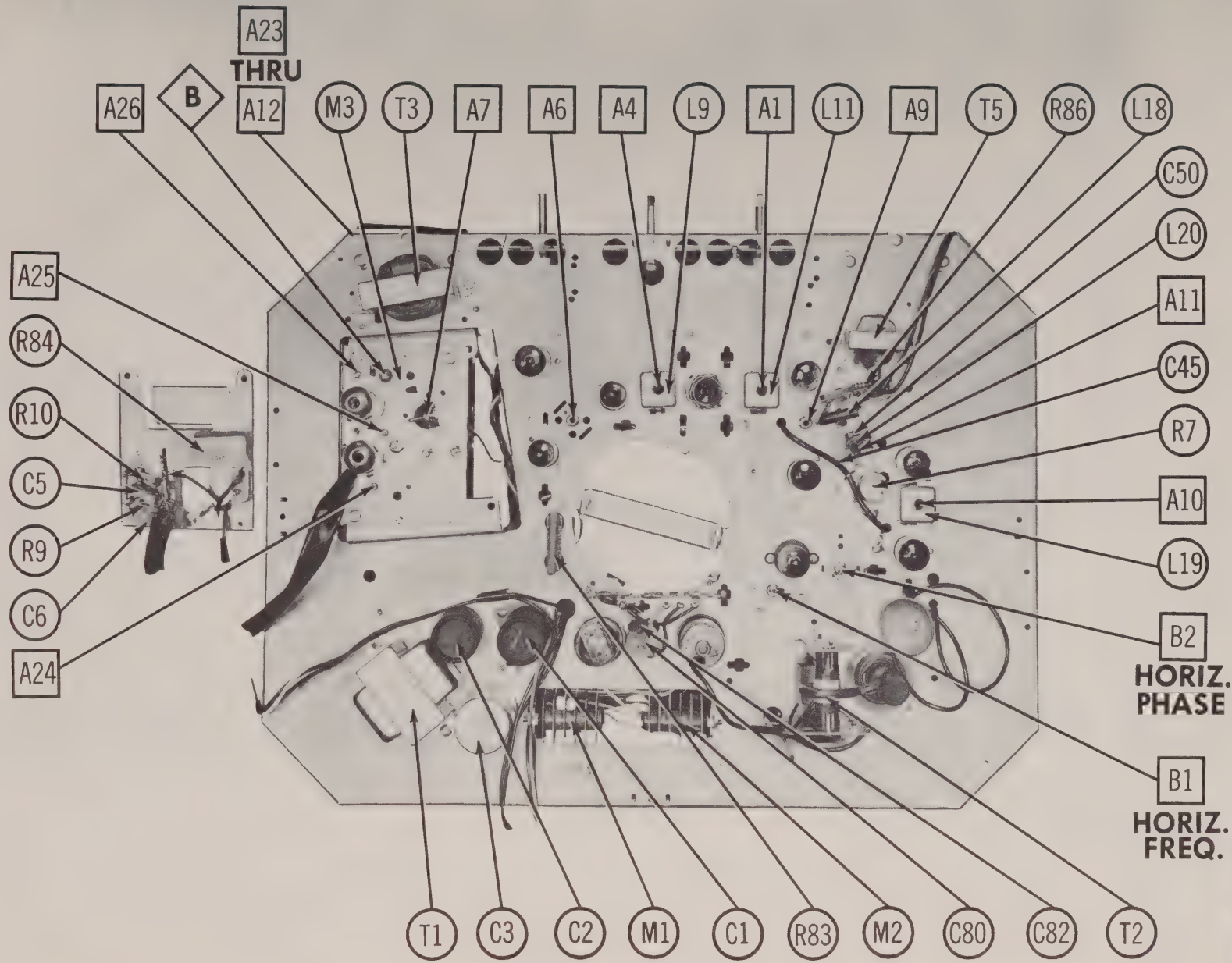
FIRESTONE MODEL
13-G-183 (Code 280-5-21T26)



FIRESTONE
MODEL 13-G-183 (Code 280-5-21726)



CHASSIS TOP VIEW

FIRESTONE
MODEL 13-G-183 (Code 280-5-11726)

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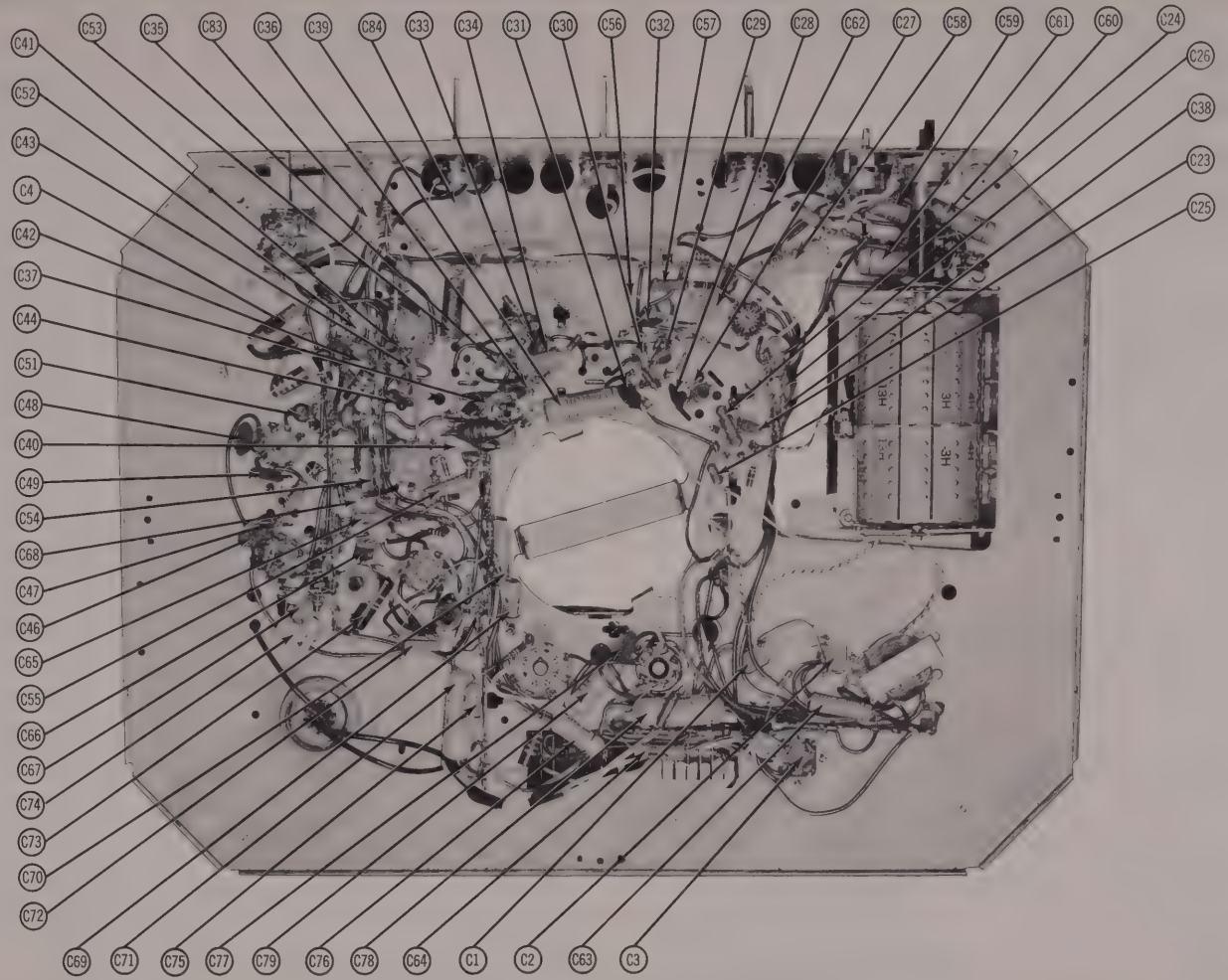

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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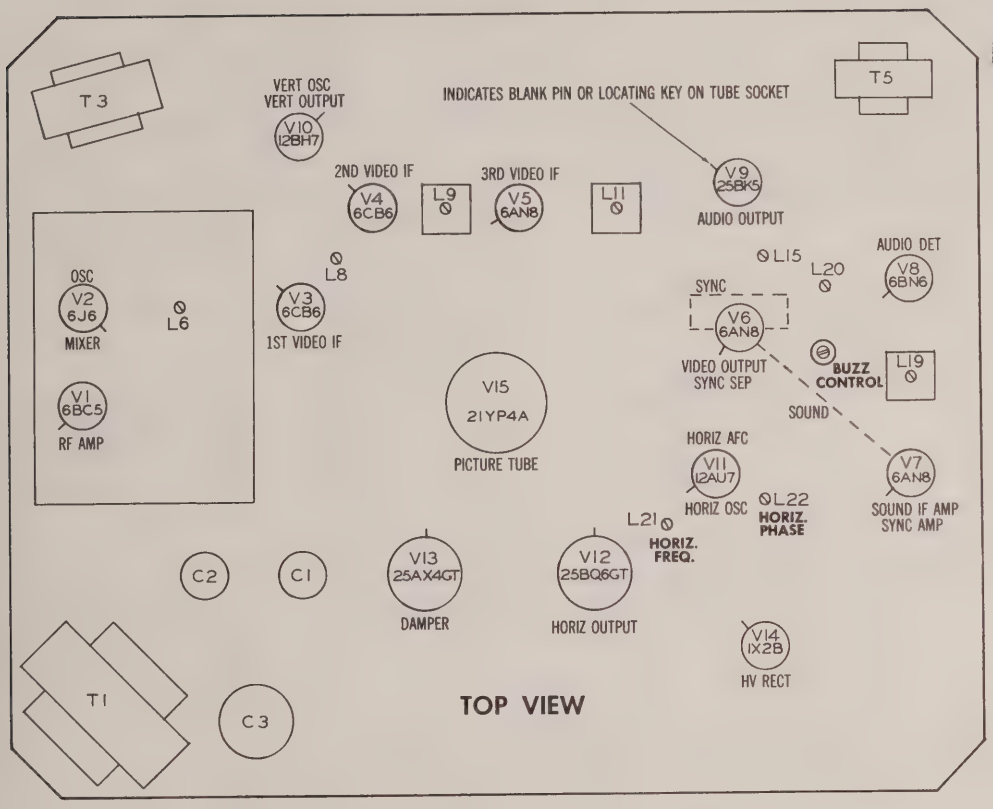
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

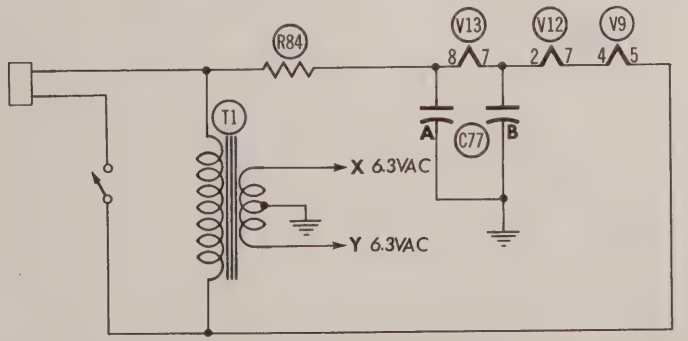
POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifiers (M1 & M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V15
Has pic, no sound - V7, V8, V9

SYNC FAILURE
No vert. sync - V7, V10
No horiz. sync - V7, V11
No vert. or horiz. sync - V6, V7

SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, V14, M1, M2
Vert. off freq. - V7, V10
Horiz. off freq. - V7, V11

NOTE: Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



FIRESTONE
MODEL 13-G-183 (Code 280-5-21T26)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use the isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V11) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 8 (grid) of 6AN8 (V5). Low side to chassis.	25MC (10MC Swp)	23.9MC 26.3MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2, A3	Connect a short jumper from pin 5 (plate) to pin 6 (screen) of 6CB6 (V4). Adjust for response similar to Fig. 1 with markers at 90%. A3 is a coupling rod and affects band width. Remove short from pin 5 to pin 6 of V4.
2.	"	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	Not used	21.3MC	"	Use VTVM. DC probe to point (A). Common to chassis.	A4	Adjust for MINIMUM deflection.
3.	"	"	"	26.5MC	"	"	A5	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM. Repeat step 2.
4.	"	"	"	24.0MC	"	"	A6	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM.
5.	"	"	"	25.0MC	"	"	A7	"
6.	"	"	25MC (10MC Swp)	21.3MC 23.8MC 26.65MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 2. Rock A7 for flat response. Increase sweep generator output and use high scope gain to view 21.3MC trap region. Adjust A4 so that 21.3MC occurs at peak of pop-up portion preceding trap notch. If response obtained is not similar to Fig. 2, repeat steps 1 thru 6.

SOUND IF ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
Tune in a TV station and adjust the fine tuning control until sound bars just appear in the picture. Adjust A8 fully counter clockwise, then clockwise until the horizontal scanning lines are smooth and continuous. Readjust the fine tuning control for clearest picture and best sound.
Insert an attenuator in series with the antenna terminals so that the signal strength may be varied from weak to strong. If a suitable attenuator is not available, stray-feed the signal to the receiver by placing the antenna lead near the antenna terminals. Reduce the signal input to the receiver so that the signal falls below the limiting level of the 6BN6 (V8) limiter-detector as evidenced by a "hiss" in the sound. Adjust the secondary of the sound take-off transformer (A9), the sound IF transformer (A10), the quadrature coil (A11) and the buzz control (R7) for maximum sound and mimimum buzz. If hiss disappears while adjusting increase attenuation until hiss reappears.

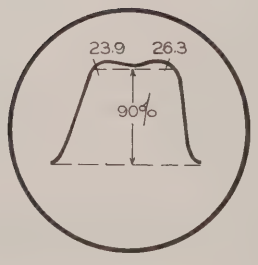


FIG.1

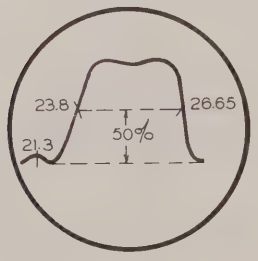


FIG.2

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

The channel oscillator adjustment screws are reached thru a hole just to the right of the fine tuning shaft.
The correct oscillator adjustment screw is accessible thru this hole as the channel switch is turned to each channel. Connect the lead of a 1.5 volt bias supply to the AGC tuner terminal. Connect positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscillososcope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 3. Use high scope gain and increase sweep generator output to view trap region. Video marker should fall at 50% on response curve.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A13	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

RF AND MIXER ALIGNMENT

Leave bias connected as under "Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A24, A25, A26	Adjust for response curve similar to Fig. 4 with markers above 90%.
9.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"		Check for response curve similar to Fig. 4. If markers fall below 70% on any channel, make SLIGHT compromise adjustments of A24, A25 and A26 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			213MC (10MC Swp)	211.25MC 215.75MC	13			
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

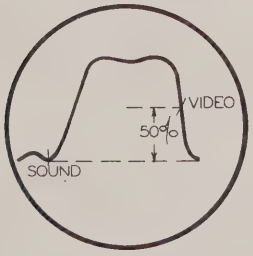


FIG. 3

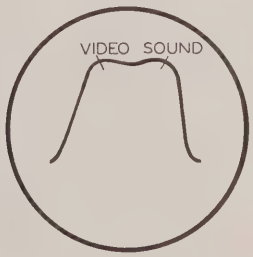


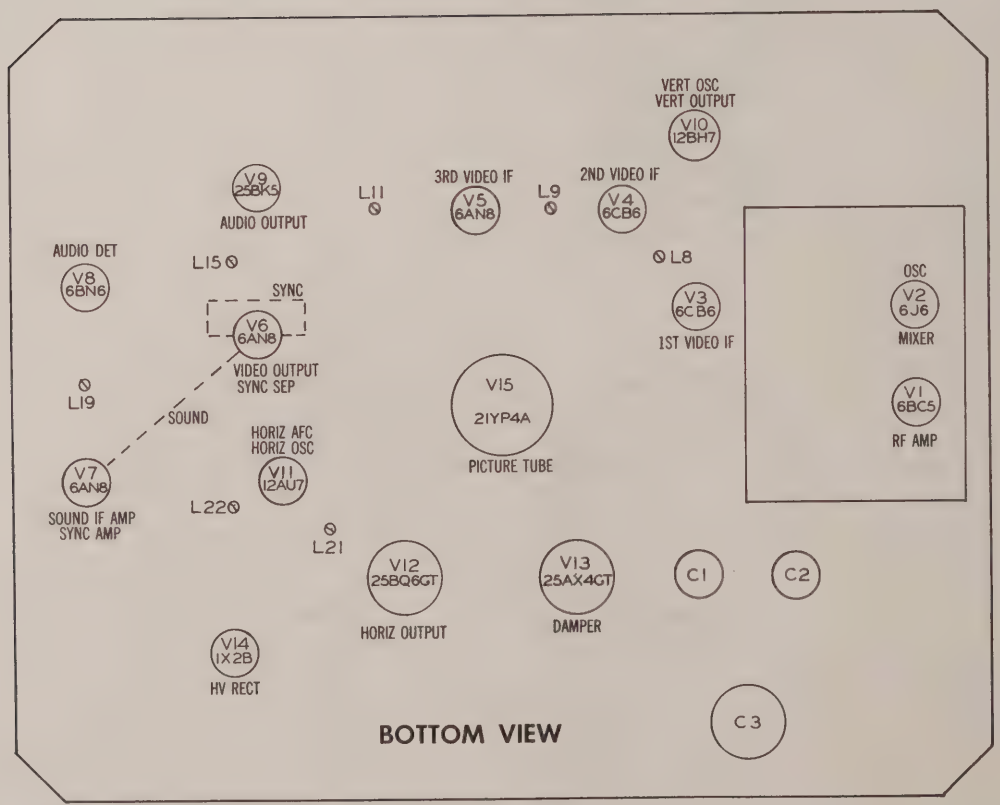
FIG. 4

PROPERTY OF
U. [illegible] TOWNSHIP
[illegible] DE ST.
[illegible] COLORADO

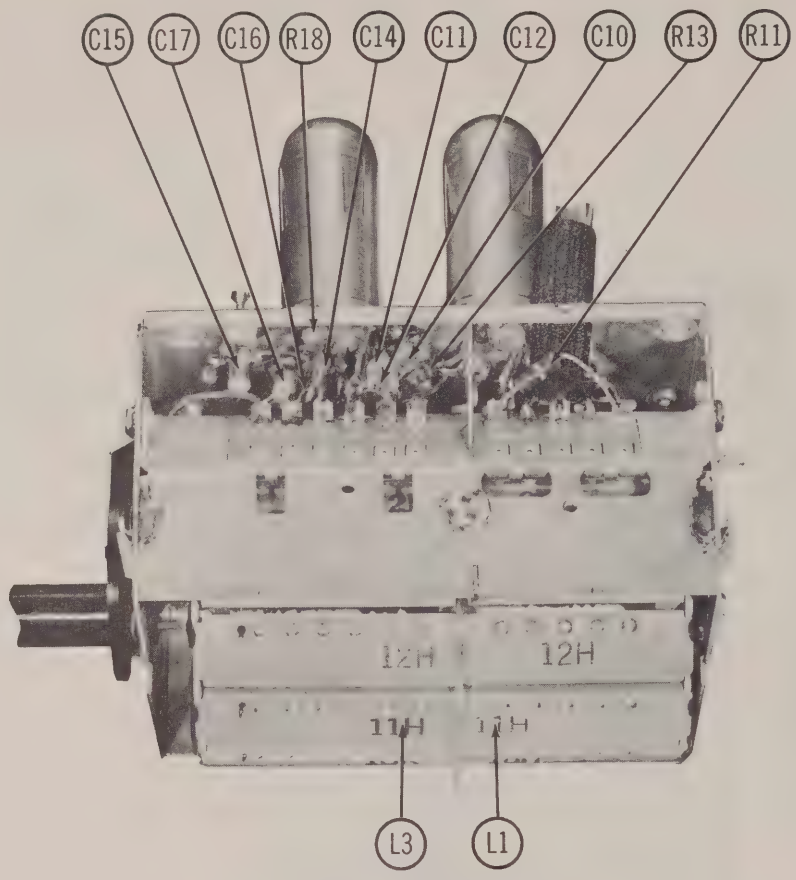
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	.1Ω	0Ω	†3.5KΩ	†4.5KΩ	0Ω		
V 2	6J6	†18KΩ	†18KΩ	.1Ω	0Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	0Ω	.1Ω	†3.7KΩ	†3.7KΩ	0Ω		
V 4	6CB6	1Meg	62Ω	0Ω	.1Ω	†3.7KΩ	†3.7KΩ	0Ω		
V 5	6AN8	4.7KΩ	4.7KΩ	.2Ω	.1Ω	0Ω	†3.5KΩ	†3.5KΩ	2.5Ω	82Ω
V 6	6AN8	†100KΩ	2.2Meg	0Ω	0Ω	.1Ω	†5.6KΩ	†2.5KΩ	1Meg	250Ω
V 7	6AN8	†8.2KΩ	22KΩ	0Ω	0Ω	.1Ω	†33KΩ	†33KΩ	100KΩ	47Ω
V 8	6BN6	300Ω	.3Ω	0Ω	.1Ω	†18KΩ	5Ω	†220KΩ		
V 9	25BK5	†440Ω	NC	100KΩ	35KΩ	35KΩ	150Ω	100KΩ	†40Ω	TP
V 10	12BH7	▲4.2KΩ	2.2Meg	1.3KΩ	.1Ω	.1Ω	▲5Meg	47KΩ	120KΩ	1.7Ω
V 11	12AU7	†50KΩ	320KΩ	0Ω	0Ω	0Ω	†30KΩ	1.4Meg	300KΩ	.1Ω
V 12	25BQ6GT	NC	35KΩ	TP	†8.2KΩ	470KΩ	NC	35KΩ	0Ω	TOP CAP ▲12Ω
V 13	25AX4GT	TP	NC	800KΩ	NC	†40Ω	NC	35KΩ	35KΩ	
V 14	1X2B		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲265Ω
V 15	21YP4A	0Ω	22KΩ	PIN 6 40Ω	PIN 10 40Ω	PIN 11 130KΩ	PIN 12 .1Ω			

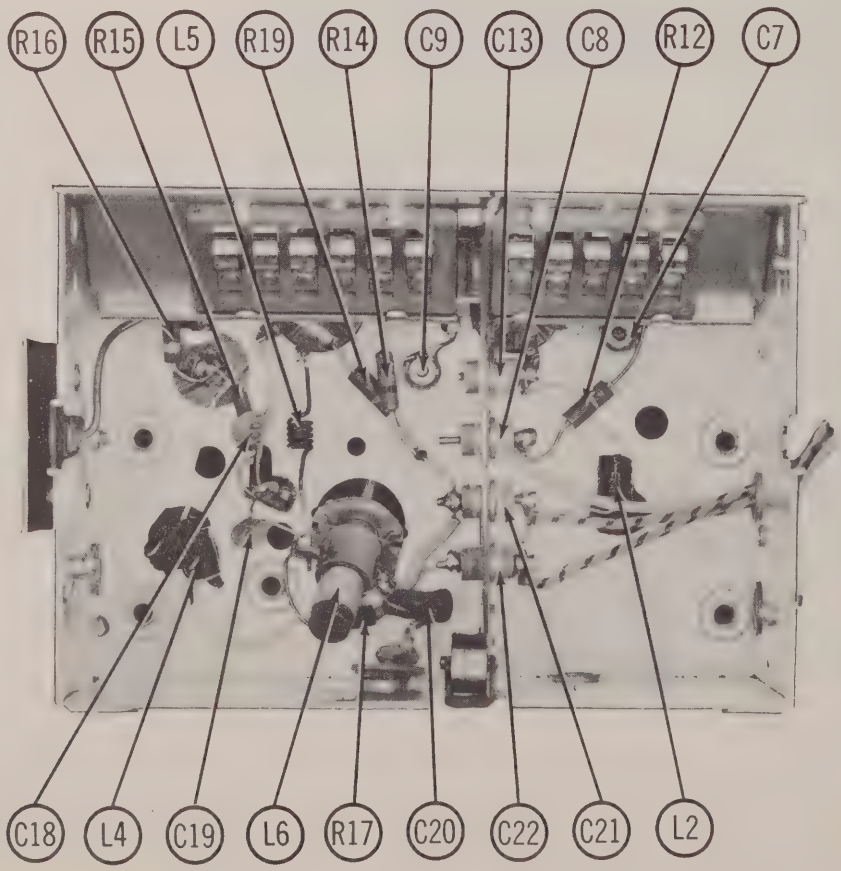
† MEASURED FROM OUTPUT OF M2.
▲ MEASURED FROM PIN 3 OF V13.
NC - NO CONNECTION
TP - TIE POINT



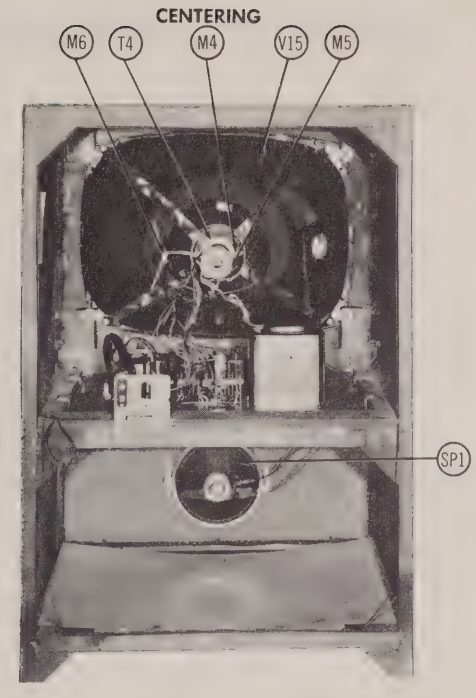
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



PROPERTY OF
L. F. DANNENSHIP
DENVER, COLORADO

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. Set the horizontal hold control (R2) to its mid-range position.

Connect a short jumper across the horizontal phase coil (L22).

Starting with the horizontal frequency slug (B1) all the way out (counter clockwise) adjust B1 in a clockwise direction, until the picture synchronizes.

Remove short from L22, connect the vertical input of an oscilloscope thru a 10KΩ resistor to the junction of L21, L22, R75 and C73. Connect low side to chassis.

Adjust the horizontal waveform slug (B2) until the broad and narrow peaks of the waveform on the scope are of equal height as shown in Fig. 5.

If necessary, during adjustment of B2, adjust B1 to keep the picture synchronized.

Remove scope from set. Picture should now remain in sync while switching off channel and back again.

If not, rotate the horizontal hold a few degrees.

ALTERNATE HORIZONTAL OSCILLATOR ADJUSTMENT FOR MODEL 2D141IA ONLY

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal hold control to its mid-range position and adjust the coarse horizontal hold control (R8) for a steady picture.

2. Turn the horizontal hold control (R2) fully counter clockwise noting the number of diagonal bars present on the screen. Adjust R8 until an equal number of diagonal bars are present on the screen at the extreme setting of R2. If this condition cannot be obtained proceed with step 3.

3. Turn the horizontal hold control (R2) counter clockwise. Turn R8 fully clockwise. Turn the horizontal oscillator coil slug (B3) counter clockwise until a break-up of raster appears. Turn B3 clockwise until raster stabilizes. Turn B3 an additional two turns in a clockwise direction.

4. Set the R2 and R8 to their mid-range position, and adjust B1 until picture synchronizes horizontally. Recheck holding action as in steps 1 and 2 above.

Set the horizontal drive trimmer (B4) clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

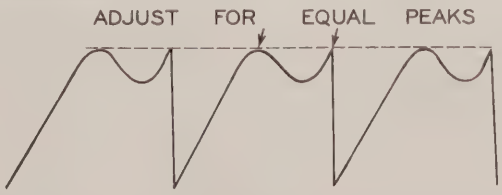


FIG. 5

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check M1 and M2. Check R79, C75, T2, T4A and other associated components.

DRIVE LINES

Check by substitution V12 and V13. Check T2, T4A, R79, C75, C74 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V12 and V13. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V11, V12 and V13. Check C69, C70 for open. Check L22, L21, C73, R2 and other associated components.

XMAS TREE EFFECT

Check by substitution V11, V12 and V13. Check T2 and T4 for internal arcing. Check L22, L21, C73, C66, R73, R72 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V10. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R59, C3C, C3D and other associated components.	Check C58, C61, R55, R56, R5 and other associated components.

INSUFFICIENT SWEEP

Substitute V10. Check vertical size and vertical linearity controls for proper operation. Check R56, T3 and other associated components.

COMPRESSED AT BOTTOM

Substitute V10. Check R5, R56, C61 and other associated components.

COMPRESSED AT TOP

Substitute V10. Check C3D, R6, T3 and other associated components.

FOLDS

Substitute V10. Check C59, C60, C61, R57 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V7. Check C54, C55, R50, R47, R51, R52 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V10. Check vertical integrator network. Check C57, C58, R55 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Substitute V11. Check C65, C70, C69, L22, L21 and other associated components.

HORIZONTAL BENDING

Check by substitution V6, V7 and V11. Check components associated with V11.

VIDEO

LOSS OF VIDEO

Substitute V6. Check L14, L16, L17, R35, R34, C40, C42 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A8. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check R34, C40, C42, L12, L13 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check C40, C42 and other associated components.

SMEAR

Substitute V6. Check L12, L13, L14, R40, R42, R35 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8 and V9. Check stage V9 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C52, C53, R41, R42, R43, R44, T5, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments R7 and A-11 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

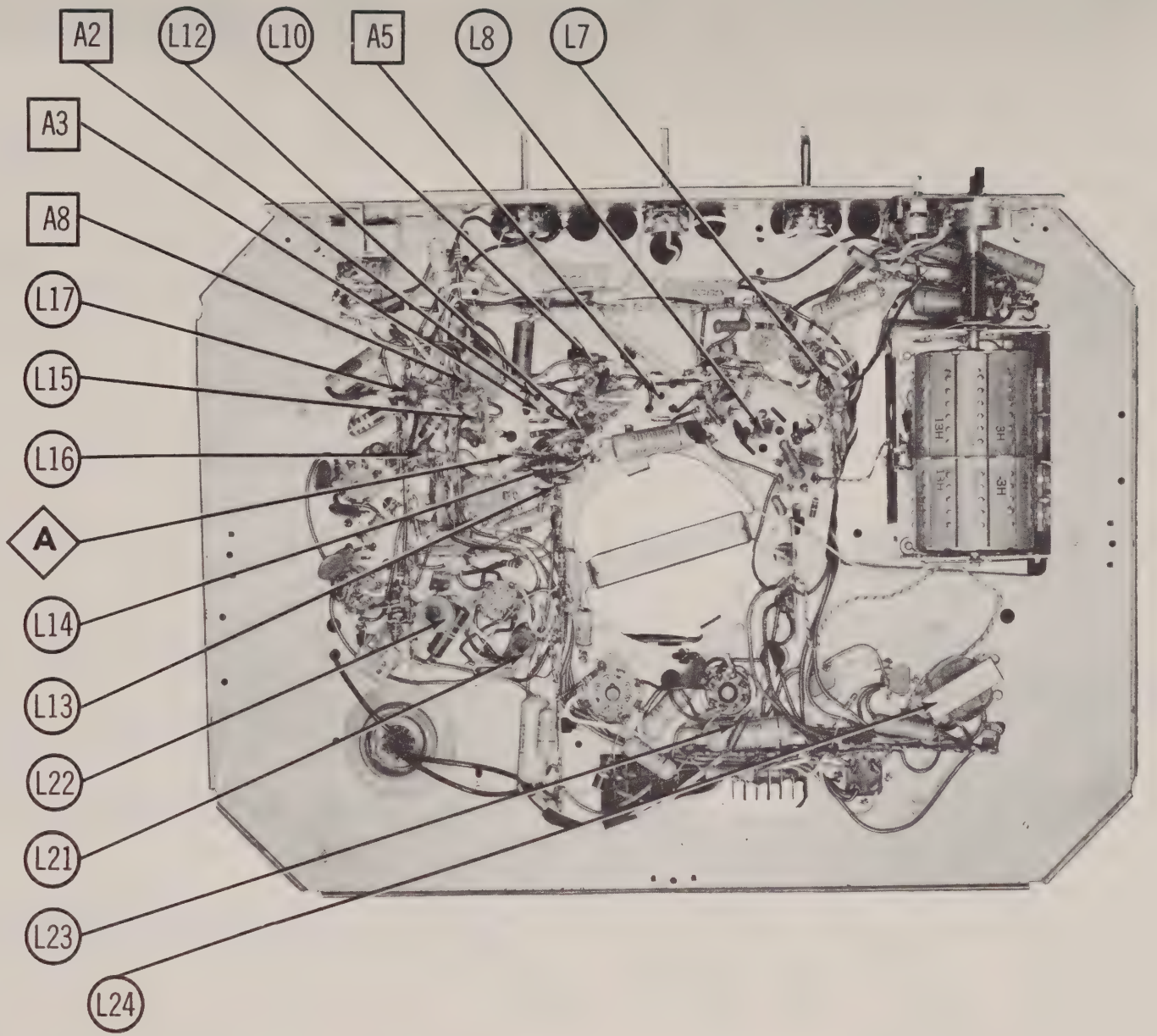
POWER

DEAD SET

If filaments fail to light, except V9, V12 and V13, check T1. If V9, V12 and V13 fail to light, check filament continuity and R84, since these tubes are connected in series. Check interlock assembly and switch on volume control. If filaments light, check M1, M2 and R83. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1, M2 and R83. Check B+ filter and decoupling network.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. BLAUVENSHIP
324 MEADE ST.
DENVER, COLORADO

PROPERTY OF
L. F. BI
3924 ME

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA: FIRESTONE PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Osc.-Mixer	6J8	6J8	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp. Video Detector	6AN8	6AN8	9DA	
V6	Video Output-Sync Sep.	6AN8	6AN8	9DA	
V7	Sound IF Amp. - Sync Amp.	6AN8	6AN8	9DA	
V8	Audio Detector	6BN6	6BN6	7DF	
V9	Audio Output	35B5	35B5	9BQ	
V10	Vert. Mult.-Vert. Output	12BH7	12BH7	9A	
V11	Horiz. AFC-Horiz. Osc.	12AU7	12AU7	9A	
V12	Horiz. Output	2159GGT	2159GGT	8AM	
V13	Damper	35AX4GT	35AX4GT	4CG	
V14	HV Rectifier	DK3B	DK3B	9Y	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: FIRESTONE PART No.	CBS	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V15	21YP4A ① 21YP4 17HP4	21YP4A ① 21YP4 17HP4 / 17HP4A 17HP4	21YP4A ① 21YP4 17HP4 / 17HP4A 17HP4	21YP4A ② 21YP4 17HP4 / 17HP4A 17HP4	21YP4A ① 21YP4 17HP4 17HP4B ②	12L 12L 12L 12L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP.	VOLT.	REPLACEMENT DATA: FIRESTONE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	150	150	8C-23494	FP1T	TM-150-150	T-080	
C2	150	150	8C-23483	FP2T	TM-150-150	T-080	
C3A	≡100	300	8C-23689		TM-4128	Q-390 / FM-4530	
B	≡10	300					
C	≡25	450					
D	60	50					
C4	5	300	8C-34174	TC60	TD-8-350	FM-4504	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	470	500	8P3-121	DD-471	GP2K-471	MC245	
C6	470	500	8P3-121	DD-471	GP2K-471	MC245	
C7	3-8		31A-979	815-10			
C8	800		13M029203				
C9	5-3		31A-956-1	829-3	321S-01-GR5	CT565A	
C10	1000		13L5Y1022	DD-102	801-001	DC-532	
C11	130		13LSD131K	DD-131	811-131	UC-5313	
C12	180		13LSD181K	DD-181	811-181	UC-5318	
C13	800		13M029203				
C14	120		13LSD121K	DD-121	811-121	UC-5312	
C15	.5-3		31A-956-1	829-3	321S-01-GR5	CT565A	
C16	10		13LSC100A	TC2-10	NP0K-100	ZT-541	
C17	5		13LS15A050C				
C18	1000		13L5Y1022	DD-102	801-001	DC-531	
C19	10		13LSC100A	TC2-10	NP0K-100	ZT-541	
C20	180		13LSD181K	DD-181	811-181	UC-5318	
C21	800		13M029203				
C22	800		13M029203				
C23	1000		8C-13201	D6-102	GP2L-102	UC-532	
C24	5000		8C-16533	D6-502	GP2-333-502	UC-532	
C25	1000		8C-13201	D6-102	GP2L-102	UC-532	
C26	5000		8C-13962	DD-502	811-005	DC-535	
C27	5		8C-12168	TC2-4R7	NP0A-050	ZT-555	
C28	47		8C-19731	TC2-47	NP0-358-470	ZT-5447	
C29	1000		8C-13201	DD-102	801-001	DC-531	
C30	680		8C-31205	D8-681	GP2K-681	UC-5368	
C31	5000		8C-13962	DD-502	811-005	DC-535	Note 1
C32	5000		8C-13962	DD-502	811-005	DC-535	
C33	5000		8C-13962	DD-502	811-005	DC-535	
C34	5000		8C-13962	DD-502	811-005	DC-535	
C35	1000		8C-13201	DD-102	801-001	DC-531	
C36	5		8C-12168	TC2-4	NP0A-050	ZT-555	
C37	5		8C-12168	TC2-5	NP0A-050	ZT-555	
C38	5000		8C-13962	DD-502	811-005	DC-535	
C39	.22	300	8K-23086			PT4022	
C40	.1	300	8K-23084	DP-104		PT401	
C41	51		8C-19793				
C42	.1	400	8K-23095	DP-104		PT401	
C43	8.3		8L-23581	TC2-8R3	NP0A-8R3	ZT-5583	
C44	33		8C-19603	TC2-33	NP0L-330	ZT-5429	
C45	30		14B-23772				Note 2
C46	10000		8Q-20359	DD-103	811-01	DC-541	
C47	470	500	8P3-121	DD-471	811-471	MC2545	
C48	10000		8Q-20359	DD-103	811-01	DC-541	
C49	10000		8Q-20359	DD-103	811-01	DC-541	
C50	10		8C-11769	TC2-10	NP0K-100	ZT-541	
C51	1000		8C-13201	DD-102	801-001	DC-531	
C52	.01	400	8K-23094	D6-103	GP2-333-103	PT611	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: FIRESTONE PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C53	.01	600	8K-23102	D6-106	GP3-333-103	PT611	
C54A	330				GP3K-471	UC-5337	
B	10000		† 17A-24823	†2PC-303	811-01	DC-541	
C	33				GP3K-350	UC-5425	
C55	.047	300	8K-23083	DP-503		PT4147	
C56A	2000					DC-532	
B	5000		◇17A-23376	◇PC-190	◇4406-01	DC-535	
C	5000					DC-535	
C57	2000		8Q-19622	D6-202	GP3-333-203	UC-535	
C58	.1	300	8K-23084	DP-104		PT401	
C59	.033	600	8K-23518	DP-303		PT6133	
C60	.1	300	8K-23084	DP-104		PT401	
C61	.01	400	8K-23096	DP-103		PT401	
C62	1000	3000	8Q-23781	DD30-102	2KV-103	DC3021	
C63	.022	600	8K-23104	DP-203	81T-02	PT6122	
C64	.022	600	8K-23583	DP-203	81T-02	PT6122	
C65	82	500	8P3-123	D8-820	801-820		
C66	82	500	8P3-123	D8-820	801-820		
C67	82	500	8P3-123	D8-820	801-820		
C68	.047	400	8K-23094	DP-503		PT4147	
C69	.022	300	8K-23083	DP-203	81T-02	PT6122	
C70	.047	300	8K-23083	DP-503		PT4147	
C71	.47	200	8K-23087			PT4047	
C72	270	500		TC2-270	NP0-358-271	MC2541	
C73	.01	600					
C74	1000	500			811-01	MC8255	
C75	.001	600	8K-23099	D6-102	GP2L-102	PT631	
C76	.047	200	8K-23094	DP-503		PT4147	
C77A	5000		8Q-23790	DD2-502	811-005	DC-535	
B	5000				811-006	DC-535	
C78	.1	600	8K-23106	DP-104		PT601	
C79	.15	200	8K-23085			PT4015	
C80	220	3000	8Q-23953	DD30-221	3KV-221	DC30323	
C81	47	3000	8Q-24038	DD30-470	3KV-470	DC30447	
C82	47	3000	8Q-23845	DD30-470	3KV-470	DC30447	
C83	.01	400	8K-23090	D6-103	GP3-333-103	PT611	
C84	5000		8Q-13962	DD2-502	811-005	DC-525	

Note 1. Some versions use 1000MMF in this application (part #8Q-18200).
Note 2. Capacity of shield lead.
† Items C54A, C54B, C54C, R45A and R45B are combined in one unit.
◇ Items C56A, C56B, C56C, R53A, R53B and R53C are combined in one unit.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: FIRESTONE PART No	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1000Ω	½	8H0A-23714	Q2-516	R7V-486	F1-4	UF13L) †	Contrast - Panel
B	1Meg	½				R3-S5	UM18A) †	Volume - Rear
C	Switch					KS-1	US-26	Attach to R1B
R2A	50KΩ	½	8H0B-24260	Q1L-123	A47-50K-S	B-31	U-35	Horiz. Hold - Note 1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	8H0B-24181	Q1L-123	A47-500K-S	B-39	U-50	Brightness - Note 2
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	100KΩ	½	8H0B-24266	Q1L-128	A47-100K-S	B-40	U-41	Vert. Hold - Note 3
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R4A
R5A	3Meg	½	8H0B-23696	Q1L-140	A47-3Meg-S	AB-84	SU-59	Vert. Size
B	Shaft		Not Req.	RQ	FS3-1/4	AE-1	Not Req.	Attach to R5A
R6A	5000Ω	½	8H0B-23407	Q1L-D4	A47-5000-S	AB-39	SU-14	Vert. Linearity - Note 4
B	with 1000Ω stop							
B	Shaft		Not Req.	RQ	FKH-1/4	AE-1	Not Req.	Attach to R6A
R7	750Ω	1	A10D-23887		39-750			Buzz wire-wound

† Universal Replacement (Mallory exact duplicate part #UF83E).
Note 1. Some versions use an alternate control part #10B-24260.
Note 2. Some versions use an alternate control part #10B-24259.
Note 3. Some versions use an alternate control part #10B-24262.
Note 4. Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R9	220KΩ	½	8R1-27	BTS-220K	
R10	220KΩ	½	8R1-27	BTS-220K	
R11	15KΩ	½		BTS-15K	
R12	47KΩ	½		BTS-47K	
R13	2200Ω	½		B...-2200	
R14	1000Ω	½		BTS-1000	
R15	220KΩ	½		BTS-220K	
R16	4700Ω	½		BTS-4700	
R17	15KΩ	½		BTS-15K	
R18	15KΩ	½		BTS-15K	
R19	22KΩ	½		BTS-22K	
R20	12KΩ	½	8R1-75	BTS-12K	
R21	1000Ω	½	8R1-62	BTS-1000	
R22	47Ω	½	8R1-46	BTS-47	
R23	1000Ω	½	8R1-62	BTS-1000	
R24	18KΩ	½	8R1-77	BTS-18K	
R25	100Ω	½	8R1-62	BTS-1000	
R26	82Ω 5%	½	8R1-150	BTS-82 5%	
R27	1000Ω	½	8R1-62	BTS-1000	
R28	82Ω	½	8R1-48	BTS-82	
R29	33KΩ	½	8R1-90	BTS-33K	
R30	1000Ω	½	8R1-62	BTS-1000	
R31	1Meg	½	8R1-98	BTS-1Meg	
R32	4700Ω	½	8R1-70	BTS-4700	

RESISTORS (cont)

ITEM No	RATING: OHMS	WATT	REPLACEMENT DATA: FIRESTONE PART No	IRC PART No	NOTES
R33	1Meg	½	8R1-98	BTS-1Meg	
R34	47Ω	½	8R1-46	BTS-47	
R35	56000Ω	2	8R4-71	BTS-56000	
R36	100KΩ	½		BTS-100KΩ	
R37	1000Ω	½	8R1-62	BTS-1000	Note 1
R38	100KΩ	½	8R1-86	BTS-100K	
R39	47Ω	½	8R1-46	BTS-47	
R40	33KΩ	1	8R1-90	BTS-33K	
R41	18KΩ	2	8R4-77	BTS-18K	
R42	68KΩ	½	8R1-80	BTS-68K	
R43	220KΩ	½	8R1-90	BTS-220K	
R44	180Ω	½	8R2-53	BTA-180	
R45	10KΩ	½		BTS-10KΩ	
R45A	220KΩ	1	† 17A-24212	BTS-220K	Note 2
B	2.5Meg			BTS-2.5Meg	
R47	560KΩ	½	8R1-95	BTS-560	
R48	100KΩ	½	8R1-86	BTS-100K	
R49	22KΩ	½	8R1-75	BTS-22K	
R50	1Meg	½	8R1-98	BTS-1Meg	
R51	4700Ω	1	8R2-70	BTA-4700	
R52	1000Ω	½	8R1-62	BTS-1000	
R53A	22KΩ		◇17A-23376	BTS-8200	
C	8200Ω			BTS-8200	

RESISTORS (cont)

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R71	47000	½	8R1-17	BTS-4700	
R72	68KΩ	½		BTS-68K	Note 1
R73	82KΩ	½		BTS-82K	
R74	100KΩ	½		BTS-100K	
R75	68KΩ	½		BTS-68K	
R76	47KΩ	½	8R8-62	BTA-47K	
R77	470KΩ	½	8R1-84	BTS-470K	
R78	130Ω	½		BTS-1300	
R79	6390Ω	3	8R4-72	BTS-6390	
R80	1.5Ω	½	9C1-1065		
R81	2600Ω	5	9C-24052	PWT-2600	
R82	2700Ω	5	9C11-1064		
R83	9Ω	1	46M-23018		
R84	15Ω	10	RC-13873		
R85	230KΩ	½	8R1-87	BTS-230K	
R86	470KΩ	½	8R1-89	BTS-470K	
R87	330KΩ	½	8R1-88	BTS-330K	

Note 1. Not used in some versions.
Note 2. Some versions use 330KΩ resistor in this application.
Note 3. Some versions use 2.2Meg resistor in this application.
Note 4. Some versions use 3900Ω resistor in this application.
† Items R45A, R45B, C54A, C54B, C54C are combined in one unit.
◇ Items R53A, R53B, R53C, C56A, C56B, C56C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No	RATING: PRI	SEC. 1	SEC. 2	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	2.6VCT @ 1.35A		18D-23698	FS90A① ②	P-3959				35F67

① Drill new mounting hole.
② Series two 6.3V windings for 12.6VCT.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Sams PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	12E-23939						FLY-80	
T3	Vert. Output Trans.	12E-23726	21S04	A-3087	X126		A-8123	28S55	A-102X
T4A	Yoke-Horiz. (MMT)	20L-24056 ①	DF601 ①③	MDF-②	V313		TYHF25/45	Y-5 ②③	Y-12 ②③
B	Vert. (44MM)			②			DY-5A ②		

① Yoke assembly includes: Yoke, Firestone part #13M-23755, yoke positioning screw, Firestone part #33JB-12186, and resistors R63 and R63.
② Use original rear cover and centering device.
③ Use original horizontal yoke damping network.
④ Use original yoke damping network.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	7KΩ	8.8Ω	13C-23704	S2113	A-3898	A-3878	28S48	S-7X	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: FIRESTONE PART No.	QUAM PART No.	NOTES
SP1	8"	PM	3.6Ω	18A-19257	8A3I	① Used in code 280-5-21720 chassis.
	8"	PM	3.6Ω	18A-21433 ①	8A1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC	REPLACEMENT DATA: FIRESTONE PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1A	Ant. Coil		0Ω CT 0Ω	31M-112-3				Channel 2
B	Ant. Coil		0Ω CT 0Ω	31M-112-3				Channel 3
C	Ant. Coil		0Ω CT 0Ω	31M-112-4				Channel 4
D	Ant. Coil		0Ω CT 0Ω	31M-112-5				Channel 5
E	Ant. Coil		0Ω CT 0Ω	31M-112-6				Channel 6
F	Ant. Coil		0Ω CT 0Ω	31M-112-7				Channel 7
G	Ant. Coil		0Ω CT 0Ω	31M-112-8				Channel 8
H	Ant. Coil		0Ω CT 0Ω	31M-112-9				Channel 9
I	Ant. Coil		0Ω CT 0Ω	31M-112-10				Channel 10
J	Ant. Coil		0Ω CT 0Ω	31M-112-11				Channel 11
K	Ant. Coil		0Ω CT 0Ω	31M-112-12				Channel 12
L	Ant. Coil		0Ω CT 0Ω	31M-112-13				Channel 13
L2	Fil. Choke		0Ω	34A-546				
L3A	RF, Mixer Grid & Osc. Coils		0Ω	31M-113-3				Channel 2
B	RF, Mixer Grid & Osc. Coils		0Ω	31M-113-3				Channel 3
C	RF, Mixer Grid & Osc. Coils		0Ω	31M-113-4				Channel 4

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
D	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-7				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		31M-112-13				Channel 13
L4	Fil. Choke	0Ω		34A-575				
L5	RF Coil	0Ω		31B-638-1				
L6	1st. Video IF	.9Ω		31B-257-8				
L7	RF Coil	1.8Ω		16A-18676	19-1002		4606	2.2 Microhenries IRC part #CLA
L8	2nd. Video IF	.2Ω		201-23829	17-1004 *	TV-103 *	6189 ■	
L9	3rd. Video IF	.2Ω		201-24043				Includes resistors and capacitors
L10	RF Choke	2.5Ω		201-20265	19-3036	TV-180	6176	35.2 Microhenries
L11	4th. Video IF	.2Ω	.2Ω	13B-23887				
L12	Series Peaking Coil	3.5Ω		16A-22923	19-6022		6152	22 Microhenries
L13	Series Peaking Coil	3.5Ω		16A-22923	19-6022		6152	22 Microhenries
L14	Shunt Peaking Coil	23Ω		16A-19365	19-4400	TV-190	4648	410 Microhenries
L15A B	4.5MC Trap 1st. Sound IF	1.9Ω 2.9Ω		201-23729				
L16	Series Peaking Coil	8.3Ω		16A-21391	19-3300		6155	305 Microhenries
L17	Shunt Peaking Coil	7.5Ω		16A-20970	19-3250	TV-185	6181	270 Microhenries
L18	Series Peaking Coil	2.5Ω		16A-24090	19-1005		4612	11 Microhenries
L19	2nd. Sound IF	.3Ω	.3Ω	201-23873				
L20	Quadrature Coil	5Ω		201-23727	20-1005	TV-151	1480 6212	
L21	Horiz. Osc.	22Ω	55Ω	13M-24086				
L22	Horiz. Phase	38Ω		13M-24085	20-1026 ▲	MWC-1 ▲	6314 ▲	
L23	RF Choke	1.5Ω		16A-21701	19-1005		4612	8 Microhenries

* Parallel with 5MMF capacitor.
■ Parallel with 5MMF capacitor and enlarge mounting hole.
▲ Parallel with .01MFD capacitor.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L24	.238A	39.5Ω	.64 HY	16A-23889	C5041	C-2996 ①	C-2328 ①	26C44 ①	C-23X ①

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: FIRESTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.238ADC	21J-23840	1236A	MR-300	6S300	6Q4	250A	
M2	.238ADC	21J-23840	1236A	MR-300	6S300	6Q4	250A	

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M3	Tuner	21I-23684	VHF
M4	Centering Device	16M-23770	
M5	Ion Trap	16M-19706	
M6	Correction Magnet		
B4	Trimmer Cap.	8E-18508	Horiz. Drive (80-480MMF) used in some versions
	Cabinet	24D-24388	Code 280-5-21T26
	Cabinet	24D-24129	Code 280-5-21T20
	Knob	5B-24393-A76	VHF Channel Selector-Code 280-5-21T26
	Knob	5B-23806-A76	VHF Channel Selector-Code 280-5-21T20
	Knob	5B-24136-A29	Fine tuning-Code 280-5-21T26
	Knob	5B-23807-A157	Fine tuning-Code 280-5-21T20
	Knob	5B-24136-A29	Picture-Code 280-5-21T26
	Knob	5B-23808-A157	Picture-Code 280-5-21T20
	Knob	5B-24392-A76	On-off-volume-Code 280-5-21T26
	Knob	5B-23809-A76	On-off-volume-Code 280-5-21T20
	Knob	5B-21240-A76	Control (3 used)-Code 280-5-21T26
	Knob	5B-24139-A76	Control (3 used)-Code 280-5-21T20

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3920 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V11, V12, V13 and V14. Check waveform W1L

If Satisfactory	If Unsatisfactory
Check T2, T4A, C78, C79, C80, C76, R79 and other associated components.	Check L22, L21, R70, R71, C68, C72, C75 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V12 and V13. Check M1 and M2. Check R83, R79, C75, C74 and other associated components.

BLOOMING

Check by substitution V12, V13 and V14. Check M1 and M2. Check R83, R79, C75, L22, L21 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

PRODUCTION CHANGES

Firestone Model 13-G-183 (Code 280-5-21T20) is identical to Model 13-G-183 (Code 280-5-21T26), except for the following changes:

COMPONENT CHANGE

R73 is replaced by a 68KΩ resistor and an 82KΩ resistor wired in series. From the junction of these two resistors an 82MMF capacitor is added to ground.

NEW CONTROLS

The horizontal hold control (R2) is changed to part #10B-23694.

The brightness control (R3) is changed to part #10B-23695.

The vertical hold control (R4) is changed to part #10B-23693.

Listed below is the replacement data for these new controls.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R2A	50KΩ	½	10B-23694	Q11-123	A47-50K-S	AB-31	SU-35	Horiz. Hold
B	Shaft		Not Req.	TQ	RN-3	AK-19	Not Req.	Attach to R2A
R3A	500KΩ	½	10B-23695	Q11-133	A47-500K-S	AB-59	TA-55L	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	100KΩ	½	10B-23693-1	Q11-128	A47-100K-S	AB-40	U-41	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

FOR MODEL 2D1411B

To adjust the horizontal oscillator circuit remove the rear cover and supply power to the set. Set the horizontal hold control (R2) at the mid-range position of its range and adjust the horizontal oscillator coil (L21) until picture synchronizes horizontally.

FOR MODEL 2D1411A

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control (R2) at the center of its range and adjust the coarse horizontal hold control (R8) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R7) located on top of the chassis for maximum sound and minimum buzz.

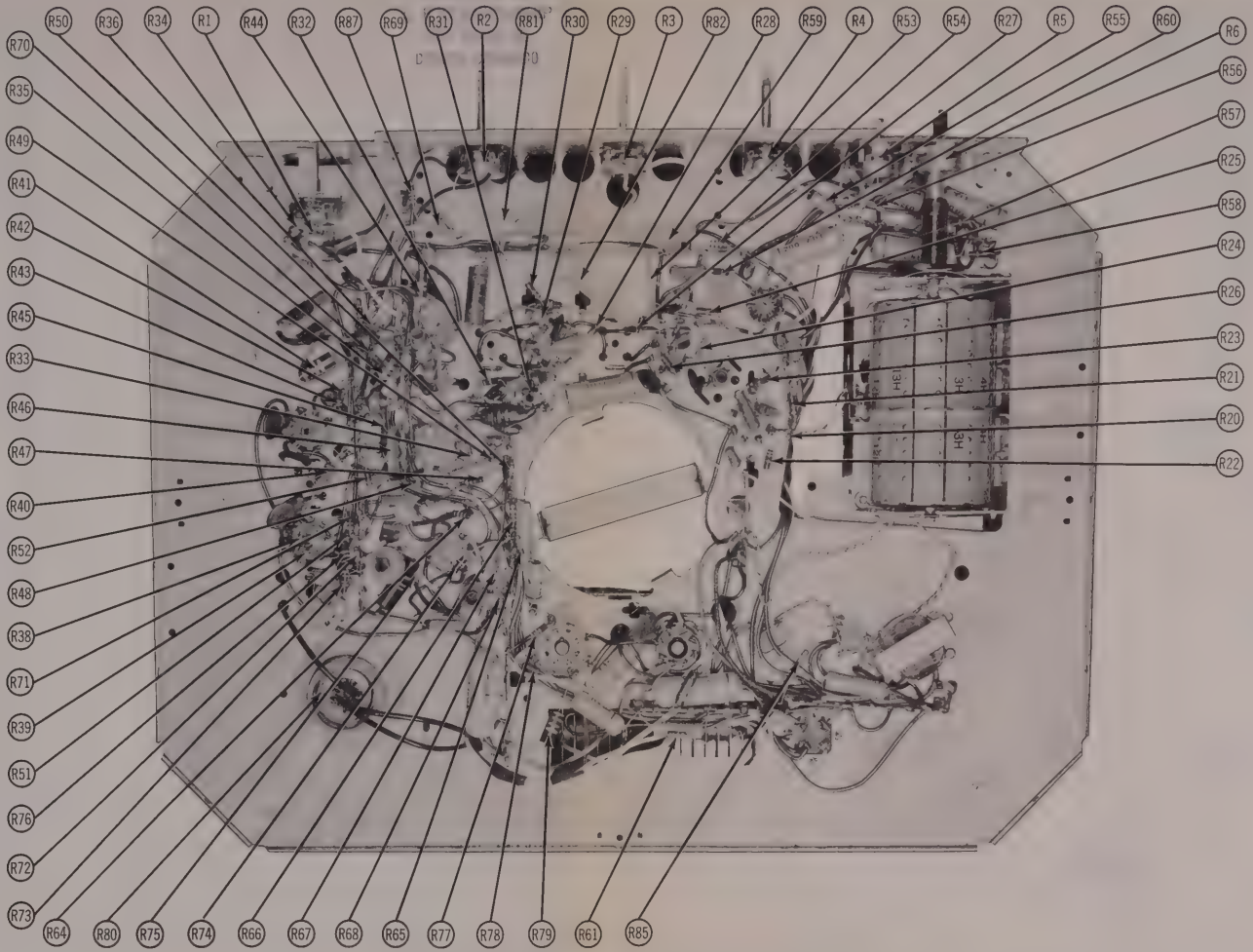
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

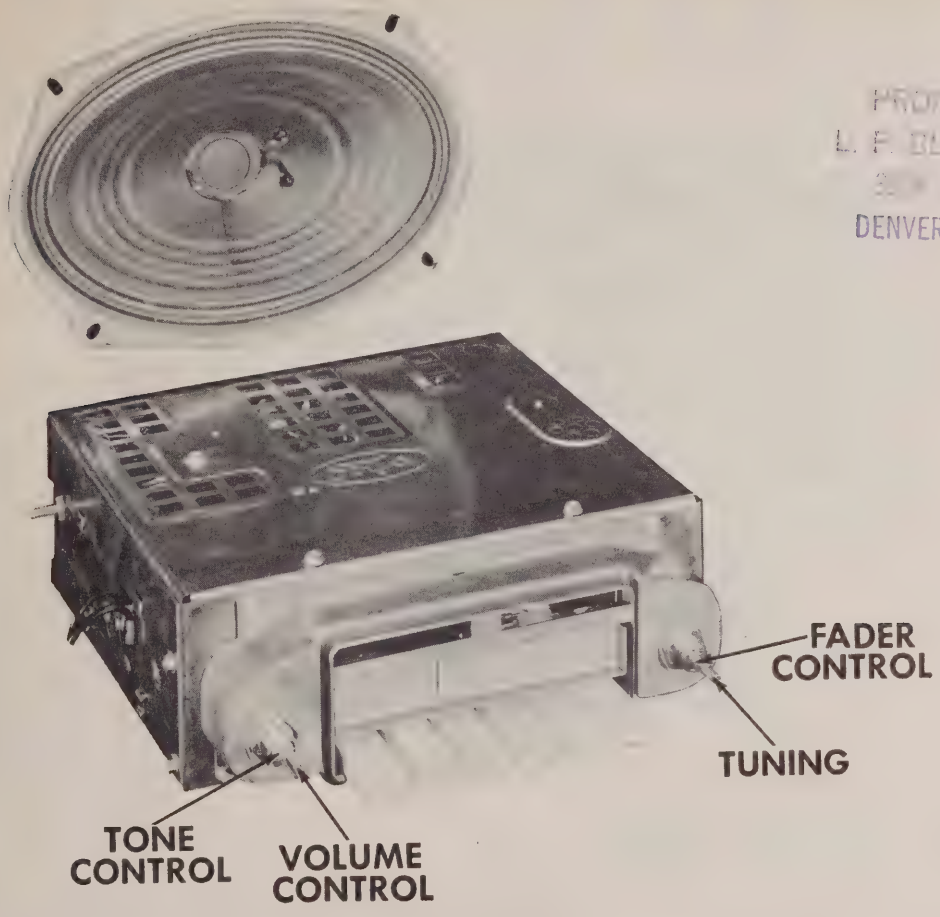
1. Remove 7 push-on type control knobs from front panel of cabinet.
2. Remove 9 wood screws. Remove rear cover.
3. Remove 2 wood screws. Remove antenna and interlock bracket.
4. Disconnect speaker leads, picture tube socket, yoke plug and HV lead.
5. Remove 5 chassis bolts. Remove chassis.
6. Remove 2 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
[illegible] NIAGARA ST.
DENVER, COLORADO

LINCOLN MODEL
5BH (FDL-18805-C, -D)



LINCOLN MODEL
5BH (FDL-18805-C, -D)

TRADE NAME	Lincoln 5BH (FDL-18805-C — 1955 Lincoln Cosmopolitan, FDL-18805-D — 1955 Lincoln Capri)
MANUFACTURER	Bendix Radio, Div. of Bendix Aviation Corp., Baltimore, Md.
TYPE SET	Battery Operated Custom Built Automobile AM Superheterodyne Receiver
TUBES (Eight)	Types 6BA6 RF Amp., 6BE6 Conv., 6AU6 IF Amp., 6AV6 Det.-AVC-AF Amp., 6C4 Phase Inv., (2) 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery RATING 6.3 Amp. @ 6.3 Volts DC
TUNING RANGE - BROADCAST	540KC-1600KC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BENDIX PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6AU6	6AU6	7BK	
V4	Det.-AVC-AF Amp	6AV6	6AV6	7BT	
V5	Phase Inv.	6C4	6C4	6BG	
V6	Audio Output	6AQ5	6AQ5	7BZ	
V7	Audio Output	6AQ5	6AQ5	7BZ	
V8	Rectifier	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	BENDIX PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	350	C-220108-4	FP328	TM-3028	T-455	
B	▲10	300					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

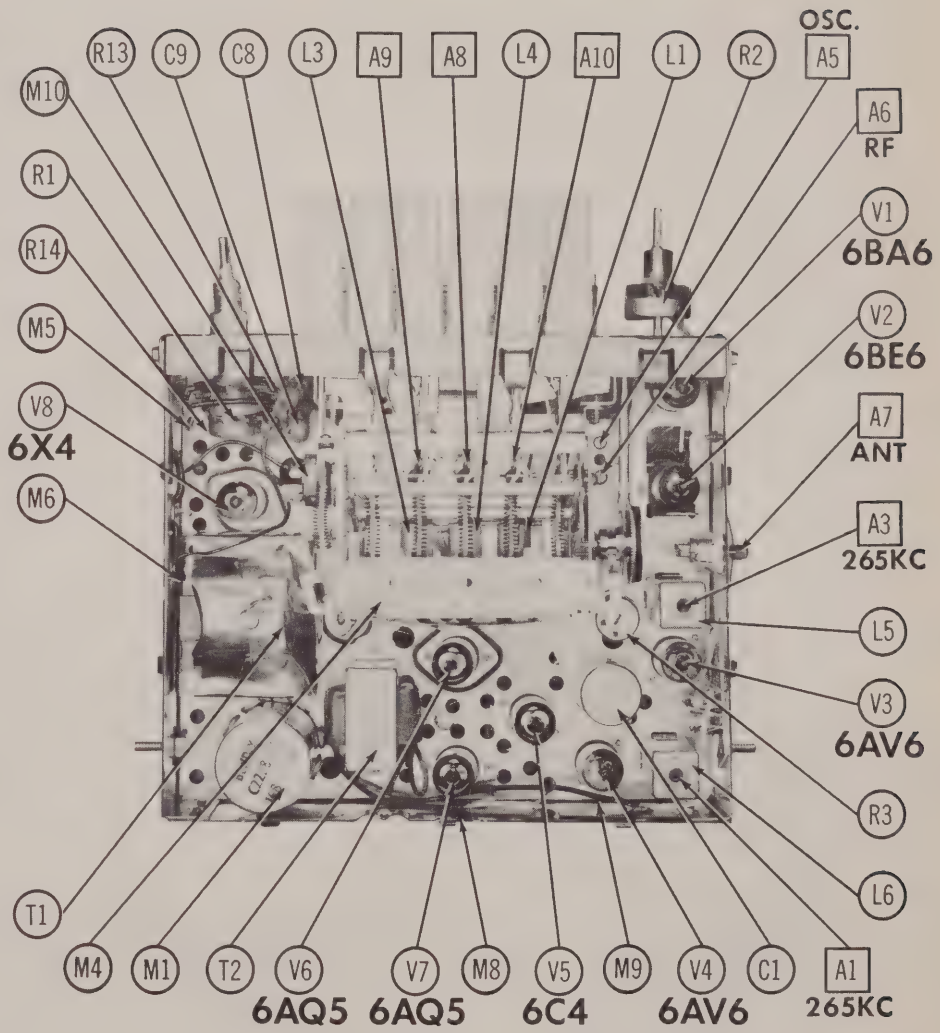
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	BENDIX PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	100		C-220095-3	D6-101	GP1K-101	UC-531	
C3	120	500	C-220099-29	TCZ-120	NP0-333-121		
C4	.1	200	C-220098-8	DF-104		PT401	
C5	10		C-220095-27	TCZ-10	NP0A-100	ZT-541	
C6	100		C-220095-26	TCN-100	N750L-101	NT-531	
C7	.1	400	C-220098-6	DF-104		PT401	
C8	.0018	200	C-220098-36	D6-182	GP2-333-182		
C9	.0082	200	C-220098-34				
C10	.0068	200	C-220098-35	D6-682	GP2-333-682		
C11	47		C-220095-4	TCZ-47	NP0-338-470	ZT-5347	
C12	.02	400	C-220098-28	DF-203	817-02	PT412	
C13	.02	400	C-220098-28	DF-203	817-02	PT412	
C14	.005	400	C-220098-32	D6-502	GP2-333-502	PT625	
C15	.003	1600	C-220098-37			PT1623	
C16	100		C-220095-3	D6-101	GP1K-101	UC-531	
C17	.5	100	C-220098-10			RF480	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	Switch		C219660-1	QJ-776A ♦				Tone - Panel
B	700KΩ	½						Volume-Rear-Tap @210KΩ
R2	11.5Ω	2	C219659-2					Fader - wirewound
R3	3000Ω	2	C219555-8		39-3000			Sensitivity - wirewound

♦ CONCENTRIKIT EQUIVALENT: K-9 KIT, BASE ELEMENTS AND SHAFTS: BS2, P15-200 (Panel)
B13-137X, R1-216 (Rear)
S-17 BUSHING

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	WATTS	REPLACEMENT DATA BENDIX PART No.	IRC PART No.	NOTES
R4	1Meg	½	C-220551B-105M	BTS-1Meg	
R5	1Meg	½	C-220551B-105M	BTS-1Meg	
R6	47kΩ	½	C-220551B-473M	BTS-47K	
R7	68Ω	½	C-220551B-680M	BTS-68	
R8	220Ω	½	C-220551B-221M	BTS-220	
R9	15kΩ	2	C-220551D-153M	BTB-15K	
R10	22Meg	½	C-220551B-226M	BTS-22Meg	
R11	1.5Meg	½	C-220551B-155M	BTS-1.5Meg	
R12	100kΩ	½	C-220551B-104M	BTS-100K	
R13	56kΩ	½	C-220551B-563K	BTS-56K	
R14	56kΩ	½	C-220551B-563K	BTS-56K	

ITEM No.	RATING OHMS	WATTS	REPLACEMENT DATA BENDIX PART No.	IRC PART No.	NOTES
R15	15Meg	½	C-220551B-156M	BTS-15Meg	
R16	6.8Meg	½	C-220551B-685M	BTS-6.8Meg	
R17	1Meg	½	C-220551B-105K	BTS-1Meg	
R18	1Meg	½	C-220551B-105K	BTS-1Meg	
R19	470kΩ	1	C-220551C-474M	BTA-470K	
R20	470kΩ	1	C-220551B-474M	BTS-470K	
R21	33Ω	1	C-220551C-331K	BTA-330	
R22	1kΩ	1	C-220551C-102K	BTA-1K	
R23	82Ω	½	C-220551B-820K	BTS-82	
R24	82Ω	½	C-220551B-870K	BTS-82	

TRANSFORMER (VIBRATOR)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA BENDIX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
T1	6.3VCT @3.8A	480VCT			C-282975-1				P-8481	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	SEC.	REPLACEMENT DATA BENDIX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.	NOTES
T2	8.5kΩ CT	4.2Ω tap ① 33Ω (8Ω)	C291798-1	Z1004					

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA BENDIX PART No.	QUAM PART No.	NOTES
SP1	6 x 9"	PM	4.2Ω	L222086-1 C282634-2 ①	69A2	① Rear seat speaker

COILS (RF-IF)

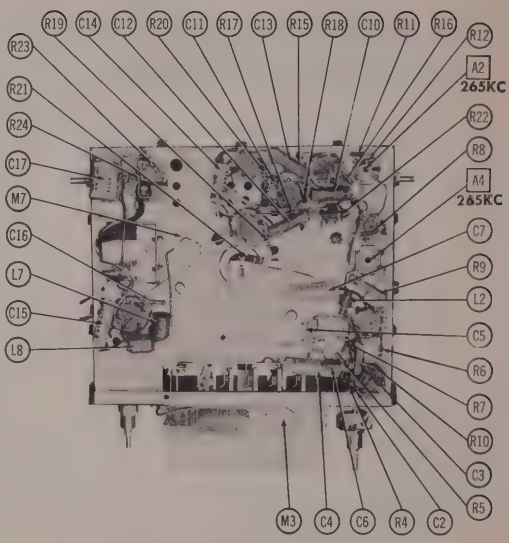
ITEM No.	USE	DC RES. PRI.	SEC.	REPLACEMENT DATA BENDIX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	12Ω						Part of Tuner Assy.
L3	RF Choke	38Ω			19-5100		4652 *	1000 Microhenries, wound on 15kΩ resistor
L3	RF Coil	12Ω						Part of tuner assy.
L4	Osc. Coil	.5Ω	3.5Ω					Part of tuner assy.
L5	Input IF	44Ω	38Ω	L-291808-2	16-6752	SC-350	13-H1	
L6	Output IF	38Ω	38Ω	L-291807-2	16-6754	SC-354	13-H6	
L7	Fil. Choke	0Ω		C-216057-4				10.5 Microhenries
L8	Vib. Hash Choke	0Ω		C-216162-3				112 Microhenries

* Parallel with 15kΩ resistor.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA BENDIX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	NOTES
M1	Interrupter	6.3V	115%	C-322810-1	5301	359	5301	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BENDIX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	C-221613-14	C-221627-1	307014 (SFE 14A)	155014	SFE14	HRI

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
M3	Dial Light	C-221319-2	#55
M4	Tuner Assy.	R-282580-4	Permeability - white pushbutton, Includes L1, L3 and L4
	Tuner Assy.	R-282580-5	Permeability - Black pushbutton, Includes L1, L3 and L4
M5	Spark Plate	C-220267-5	"A" Lead
M6	Spark Plate	C-220267-1	Dial Light Lead
M7	Spark Plate	C-220267-1	Filament
M8	Spark Plate	C-220267-5	Audio Output Transformer (T2)
M9	Spark Plate	C-220267-5	Audio Output Transformer (T2)
M10	Switch	C-218668-1	On-off
	Trimmer Cap.	C-219085-1	Dual Trimmer: Osc. (340-400MMF) & RF (4-75MMF), unit also consists of 20MMF, 270MMF, 100MMF Fixed Cap.
	Trimmer Cap.	C-219083-1	Ant. (4-75MMF)
	Knob	L-294636-1	Disc Type (Fader & tone)
	Knob	C-283070-1	Tuning & volume (Black)
	Knob	C-283070-2	Tuning & volume (white)
	Pushbutton	N-685199-1	Black (Right end button)
	Pushbutton	N-685199-2	Black (2nd. from right)
	Pushbutton	N-685199-3	Black (3rd. from right)
	Pushbutton	N-685199-4	Black (4th. from right)
	Pushbutton	N-685199-5	Black (5th. from right)
	Pushbutton	N-685199-6	Black (6th. from right) on-off
	Pushbutton	N-685199-7	White (right end button)
	Pushbutton	N-685199-8	White (2nd. from right)
	Pushbutton	N-685199-9	White (3rd. from right)
	Pushbutton	N-685199-10	White (4th. from right)
	Pushbutton	N-685199-11	White (5th. from right)
	Pushbutton	N-685199-12	White (6th. from right) on-off
	Sub-dial	L-676058-1	
	Dial Pointer	C-676071-1	

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Set tone control to "Normal".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Fig. 1	Thru dummy antenna to antenna receptacle	265KC (400% Mod)	High frequency end of dial.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output in order given.
2.	"	"	1605KC	"	"	A5, A6	"
3.				Near 1600KC		A7	Readjust A7 after receiver is installed in car with antenna fully extended and tuned to a weak station near 1600KC.
4.				High frequency end of dial	"	A8, A9, A10	Adjust tuner cores, out of coils but still within forms, for maximum output.
5.	Fig. 1	Thru dummy antenna to antenna receptacle.	1605KC	"	"	A5, A6, A7	Adjust for maximum output in order given.
6.	"	"	1200KC	"	"	A8, A9, A10	"
7.	"	"	1605KC	"	"	A5, A6, A7	"

Steps 5, 6 and 7 necessary only when core or tuning coil has been replaced.

PUSHBUTTON ADJUSTMENT

1. Push pushbutton slightly to right and pull out until it stops. (Do not remove unless for replacement).
2. Tune manually for desired frequency.
3. Push pushbutton back on shaft until it stops and releases.

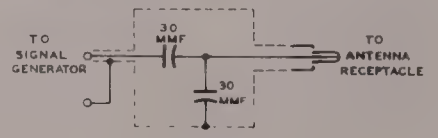
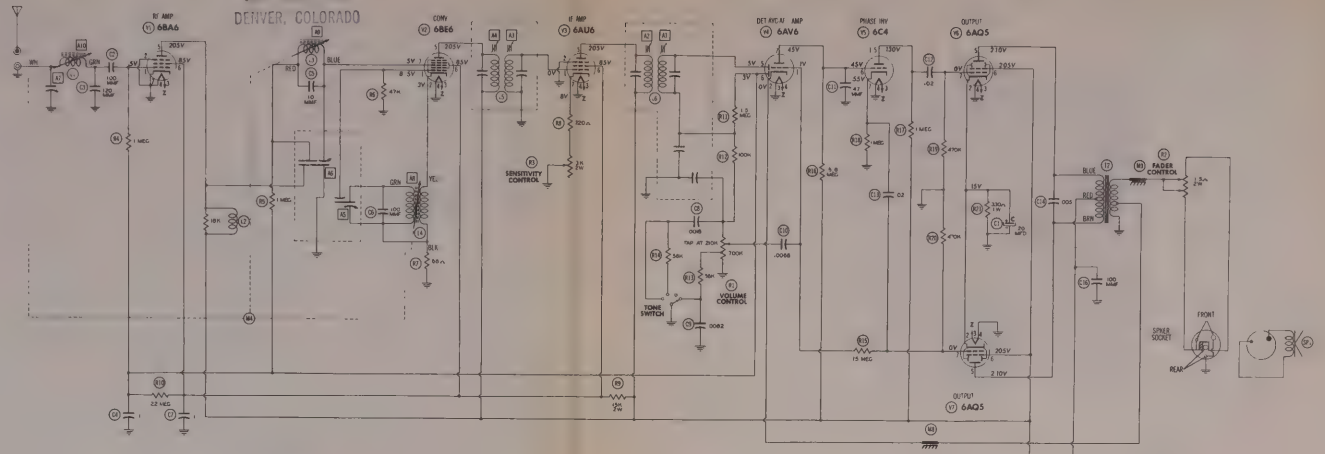


FIG. 1



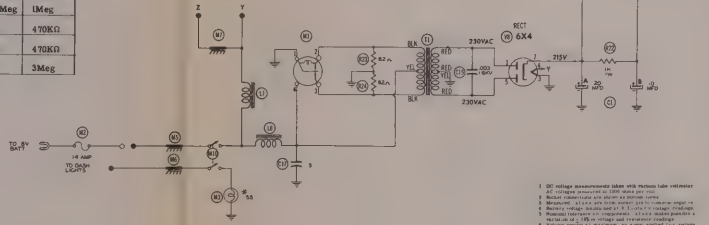
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	3Meg	0Ω	.4Ω	0Ω	†1KΩ	†16KΩ	0Ω
V 2	6BE6	47KΩ	68Ω	.4Ω	0Ω	†1KΩ	†16KΩ	3Meg
V 3	6AU6	40Ω	0Ω	.4Ω	0Ω	†1KΩ	†16KΩ	220Ω
V 4	6AV6	15.4Meg	.1Ω	0Ω	.4Ω	800KΩ	2Meg	†6.8Meg
V 5	6C4	†1Meg	NC	.4Ω	0Ω	†1Meg	†6.8Meg	1Meg
V 6	6AQ5	470KΩ	330Ω	.4Ω	0Ω	†250Ω	†1KΩ	470KΩ
V 7	6AQ5	470KΩ	330Ω	.4Ω	0Ω	†250Ω	†1KΩ	470KΩ
V 8	6X4	400Ω	NC	0Ω	.4Ω	NC	400Ω	3Meg

SENSITIVITY CONTROL SET AT MAXIMUM SENSITIVITY.
†MEASURED FROM PIN 7 OF V8.
NC-NO CONNECTION.

IF=262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



1 DC voltage measurements taken with Philco tube voltmeter at voltages measured in 1000 ohms per volt.
2 Socket measurements are shown as bottom view.
3 Line voltage is 117 volts AC, 60 cycles, unless otherwise noted.
4 Battery voltage readings and all R.F. circuit voltage readings.
5 Manufacturer reserves the right to change circuits and values without notice in the interest of improvement.
6 Values shown are ± 10% in voltage and resistance readings.
7 Values shown are maximum or ranges applied for voltage measurements.

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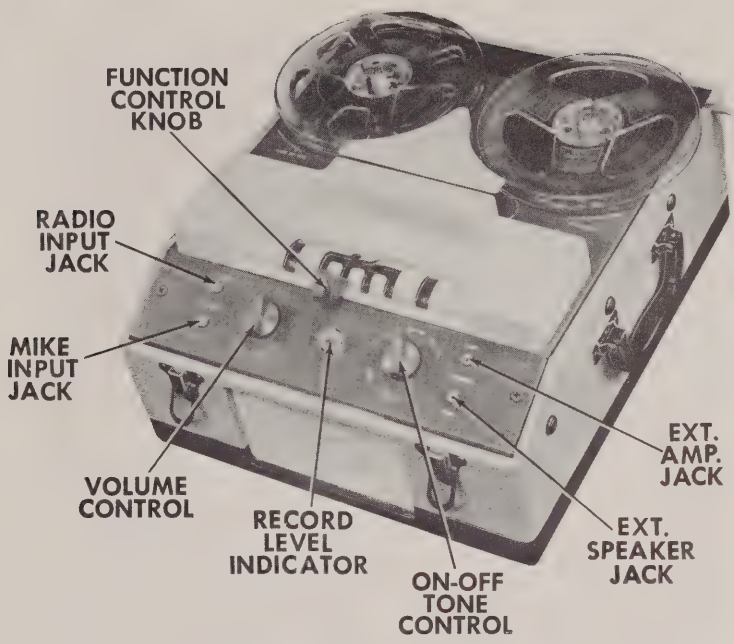

Figure 1

GENERAL INFORMATION

The Pentron Model CT-1 Tape Recorder features a Monomatic* control which controls all mechanical functions of the recorder. They are as follows: Wind, Play (either 3 3/4 or 7 1/2 ips.), Rewind, Neutral, and Record (either 3 3/4 or 7 1/2 ips).

This recorder is of the dual track type, permitting two separate tracks of material to be recorded and played back on a reel of tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver, or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker may be used through use of the "Spkr". Output Jack. The output of the recorder may be fed into an external amplifier, radio, TV receiver, or public address system, by use of the "Ampl." Output Jack.

Model CT-1 has two tape speeds, 7 1/2" and 3 3/4" per second. Using both tracks of the tape, the recording time is as follows:

SIZE REEL	3 3/4" SPEED	7 1/2" SPEED
5"	1 hour	1/2 hour
7"	2 hours	1 hour

This recorder is designed to operate on 60 cycle, 110-120 volts, AC supply only.

CAUTION: Before connecting recorder to line supply be absolutely certain that it agrees with the above specifications.

*A Registered Tradename of the Pentron Corporation.

Manufactured by:

The Pentron Corporation
777 South Tripp Avenue
Chicago 24, Illinois

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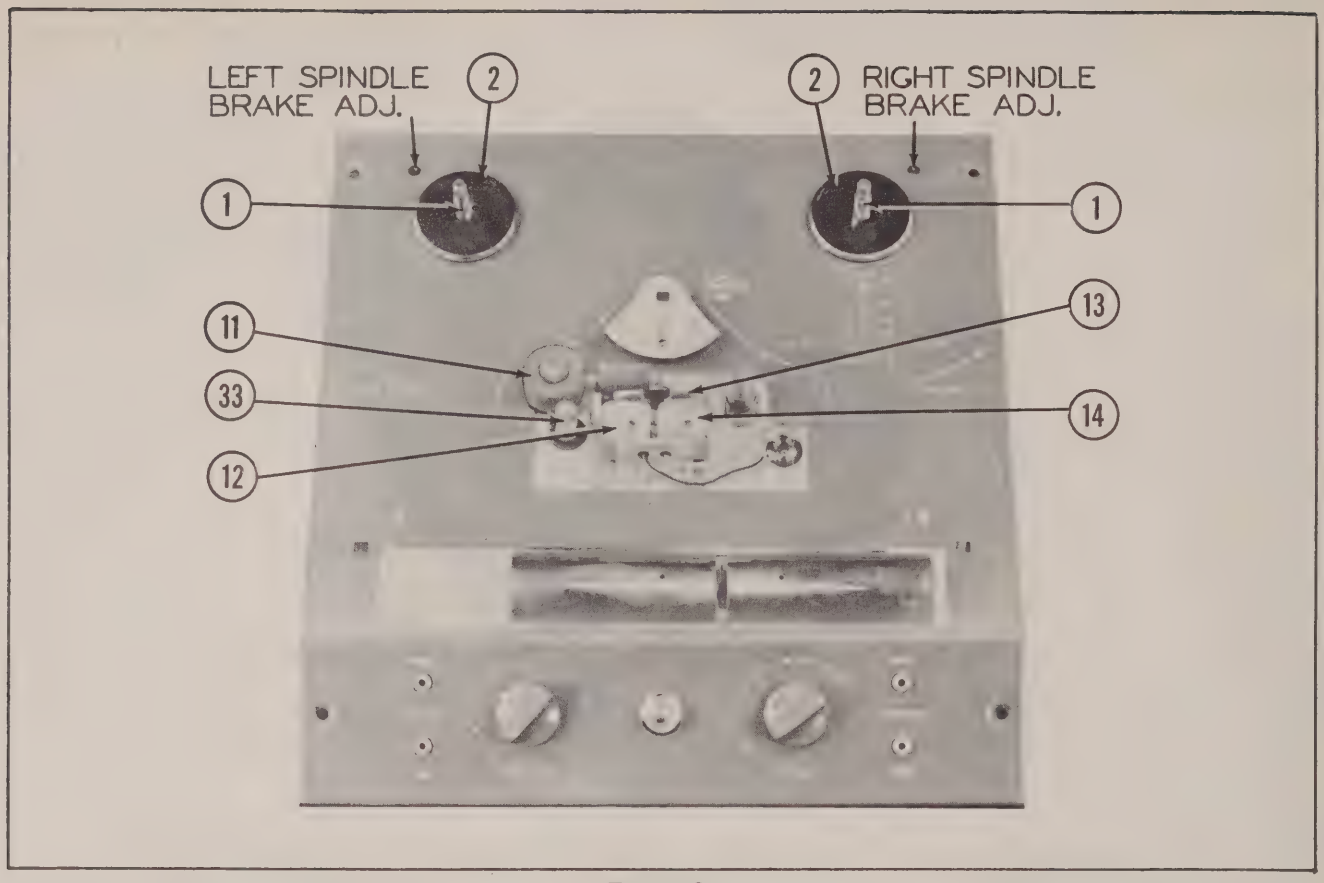

Figure 2

FUNCTIONS OF THE MONOMATIC CONTROL

Wind Position-

When in this position you may skip forward at high speed to any given spot on the tape.

Rewind Position-

Shifting the control knob to the Rewind position enables you to rewind tape at high speed to any given spot or to the end of the reel.

Play Position-

Shifting the control knob into the appropriate 7 1/2 or 3 3/4 "Play" slot sets the amplifier and tape transport mechanism for the playback function.

Record Position-

Depressing the red record lock button and shifting the control knob into the desired 7 1/2 or 3 3/4 "Record" slot sets the amplifier and tape transport mechanism for the record operation.

Neutral Position-

Placing the control knob in any one of its vertical positions places the mechanism in a neutral position which stops all movement of the tape.

OPERATING INSTRUCTIONS

Preparing The Pentron For Recording-

1. With the On-Off-Tone Control in the "Off" position, insert the AC power cord plug into a convenient wall receptacle of the proper rating.

2. Place an empty reel on the left hand reel support (2) making sure that the small protruding metal finger on the reel support fits into one of the slots at the center of the plastic reel.

3. Place a reel of Type "A" wound tape (dull coated side facing inward) on the right hand reel support so that the tape will feed off the reel as shown in Fig. 3. The tape should then be pulled off the reel with sufficient slack to permit placement into the tape slot. When this is done the coated (dull) side of the tape should be facing toward the front of the machine. The tape, after threading through the slot, should be

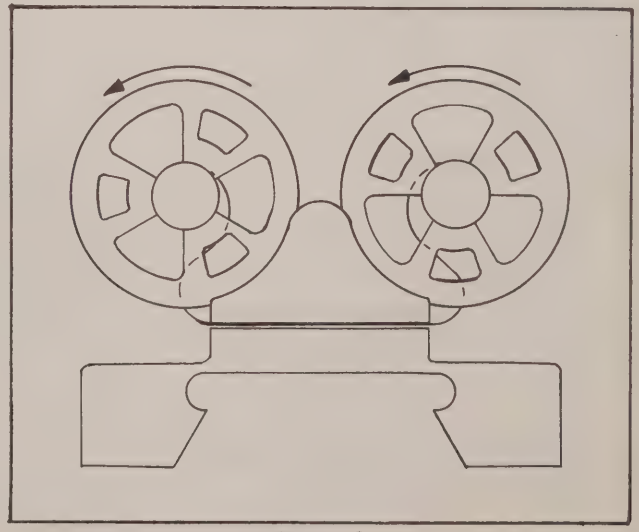

Figure 3

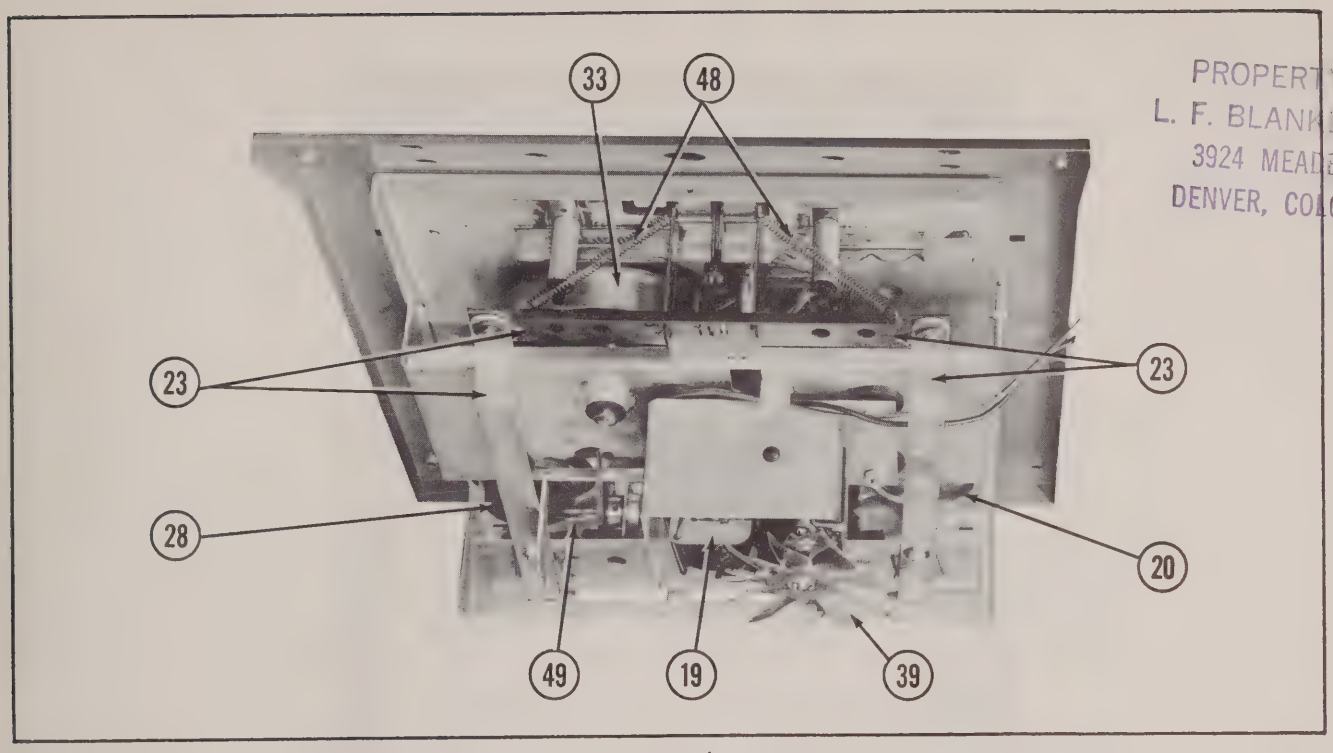

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Figure 4

wound around the hub of the take-up reel in a counter-clockwise direction.

4. Turn the On-Off-Tone Control clockwise until a click is heard. This supplies power to the entire recorder.

To Record From Microphone-

NOTE: Erasing of recorded material takes place automatically when new material is recorded, therefore, no special step is necessary to erase old recordings before new recordings are made.

1. Insert the microphone plug into the "Mic." Input Jack.

2. Slide the Monomatic control to the desired speed position and shift into record while simultaneously pressing the red record lock button.

3. While talking into the microphone, adjust the "Volume" Control until the loudest portions of the signal just cause the record level indicator to flash.

To Record From Radio, TV Receiver Or Phonograph-

1. Using any standard interconnecting cable (such as the Pentron accessory cord X310), fasten the two clips to the radio, TV receiver, or phonograph speaker terminals and insert the plug into the "Radio" Input Jack on the recorder.

2. Turn recorder on and select the proper record position (3 3/4 or 7 1/2 ips.). Proceed with the recording as described under "To Record From Microphone".

Dual Track Recording-

1. This recorder is designed so that each reel of tape holds two full length recordings, one on each half of the dull side of the tape.

2. After the first track has been recorded, a second recording can be made on the same tape by removing the reels from the recorder (do not rewind), turning them over, then placing the full reel on the right-hand spindle and the empty reel on the left-hand spindle.

3. Thread the tape and proceed with the recording as previously described.

4. After the second track has been recorded, the first track is ready to be played without rewinding, by changing reels as described in step No. 2.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

To Monitor While Recording-

By plugging a set of earphones into the "Ampl." Output Jack the recording may be monitored. In an emergency your microphone will serve as an earphone if plugged into this same jack. Continued use of the microphone in this fashion is not recommended since permanent damage may result.

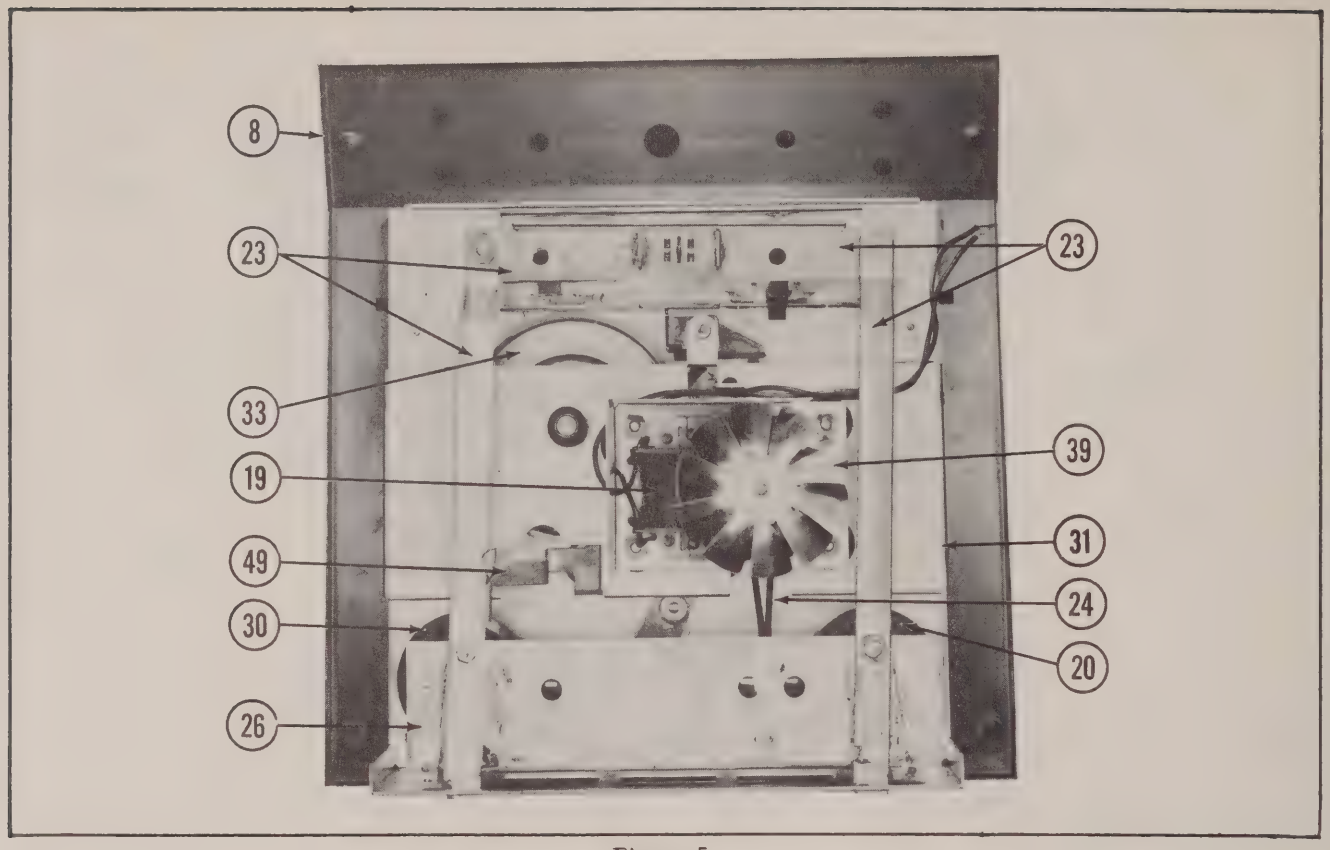

Figure 5

To Use Wind And Rewind-

Shift the Monomatic control knob into the appropriate slot marked "Wind" (fast forward) or "Rewind" (fast reverse). Shifting the control knob to "Rewind" position enables you to rewind tape at high speed to any given spot or to the end of the reel. Shifting to the "Wind" position enables you to skip forward at high speed to any given spot.

To Playback Recordings-

1. Shift the Monomatic control into the appropriate 7 1/2 or 3 3/4 play position.

2. Adjust "Volume" and "Tone" controls for desired listening level.

To Use "Spkr." Output Jack-

This output is used when a speaker in addition to the one in the unit is desired. Simply plug the external speaker into this output.

To Use "Ampl." Output Jack-

This is a high impedance output used to feed the output of the recorder into an external amplifier, radio or TV receiver, or public address system.

To Use Recorder As P. A. System-

By plugging the microphone into the "Radio" Input Jack the CT-1 may be used as a public address system. For more volume or controlled sound placement an external speaker may be plugged into the external speaker jack.

ADJUSTMENTS

To Adjust The Brakes-

1. Slide the Monomatic control knob to its extreme left neutral position. Insert a 5/64" Allen Hex. Key through hole in top panel near left spindle and into the socket of the brake adjustment screw.

2. Adjust brake by turning screw, (clockwise rotation will increase brake pressure) so that only the slightest contact can be felt when rotating the left spindle.

3. Remove wrench and place control knob in the "Rewind" position. The left spindle must now be completely free. If any braking at all can be felt in this position, the brakes are adjusted too tightly.

4. Slide the control knob to the extreme right neutral position. Insert a 5/64" Allen Hex. Key through hole in top panel near right spindle and into the socket of the brake adjustment screw.

5. Adjust brake on right spindle the same way as on left side.

6. Remove Allen Key and place control knob in "Fast Forward" position. The right spindle must now be completely free or brake is adjusted too tightly.

Play-Record Head Adjustment-

It is very important that Play-Record Head (12) be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result.

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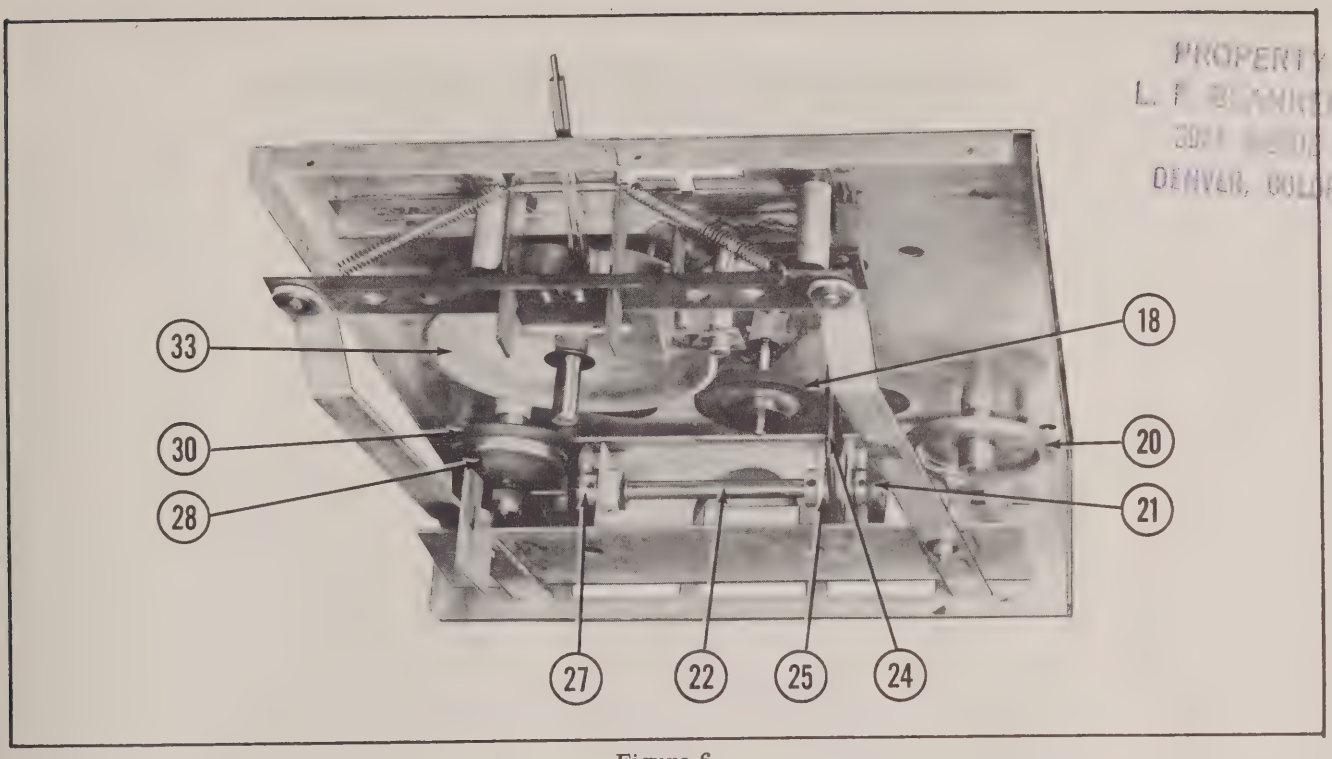

Figure 6

CAUTION: The head was adjusted and sealed in place at time of manufacture and further adjustment should not be necessary unless the head becomes faulty and replacement is required. There are two adjustments to be made, they are as follows:

1. One is the head height. This should be adjusted so that the top edge of the tape lines up evenly with the top edge of the record head lamination. Adjustment can be made by loosening screw (point "B" on exploded view) and slightly raising or lowering play-record head (12).

2. The second adjustment is made by turning head so that the air gap in the head lamination is at right angles to direction of tape travel. This assures maximum output and frequency response. Adjustment is best accomplished with the aid of a pre-recorded, constant 3000 cycle tape. Place the pre-recorded tape on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. While playing the 3000 cycle tape, loosen screw (point "B" on exploded view) and rock the head from side to side and notice the variation in the output voltage at the voice coil. Tighten the head in the position of highest output. After the adjustment is made make certain that the head was not moved up or down.

Erase Head Adjustment-

1. Erase head (14) should be adjusted so that the top edge of the tape lines up evenly with the top edge of the erase head lamination. Adjustment can be made by loosening screw (point "A" on exploded view) and slightly raising or lowering erase head (14).

PARTS REPLACEMENT

To Replace Head Laminations-

Worn out or damaged head laminations can be replaced without disturbing the play-record and erase head adjustments. On record head (12), remove lamination by prying out with a screw driver. Press in new lamination with fingers until it bottoms on yoke. Erase head lamination can be replaced in the same manner. It is important to replace laminations with steel section uppermost.

To Replace Belts-

1. With control knob in "Rewind" position, remove clutch adjustment nuts on lower end of the take-up spindle (left side) and lower the clutch plate (28) exposing the spindle hub (30).

2. Loosen the spindle plate set screw and remove spindle and plate.

3. With control knob in "Wind" position, loosen the set screw in the hub of rubber drive wheel (21). Remove drive wheel (21). Slide drive shaft (22) to the left until clear of the right hand drive shaft bearing.

4. Place new belt over drive shaft and replace shaft in bearing. Make sure thrust washer between drive pulley (25) and bearing is in place.

5. Replace thrust washer and rubber drive wheel (21), adjusting the thrust for free rotation of shaft without excessive end play. Excessive end play may cause noisy operation.

6. Place belt into groove of drive pulley (25). Insert a suitable tool through the motor support plate from the right front towards the rear and grasp belt (24). Pull belt with a 90° twist over the motor pulley. Belt should lead from the top of the drive pulley to the right side of the motor as in Fig. 9.

7. Replace take-up spindle and clutch as follows:

(a)Replace spindle (32) with "E" ring and thrust washer through top of spindle bearing and placing on it parts in the following order: Thrust washer, spindle

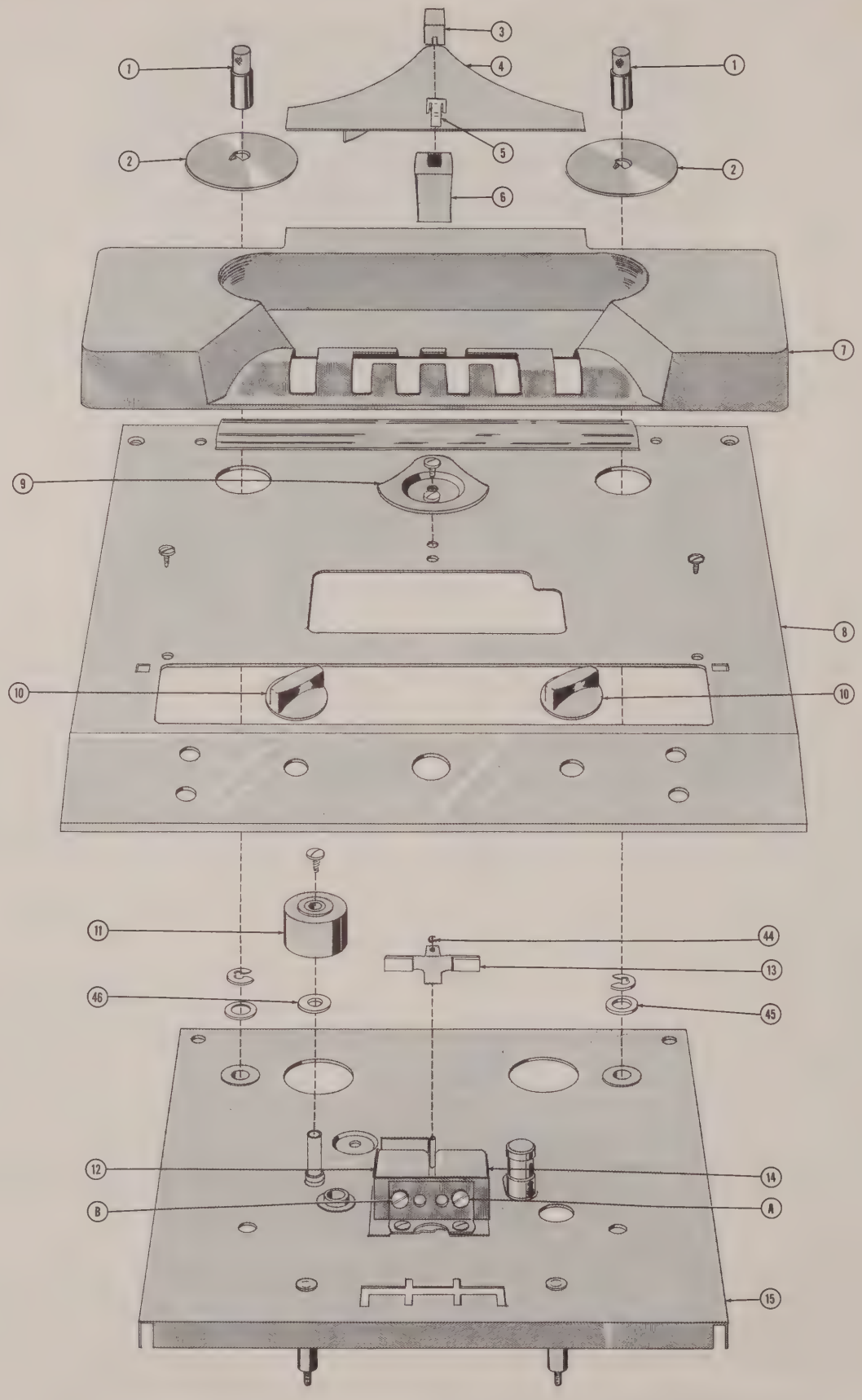

Figure 7A. Exploded View Of Parts Above Baseplate.

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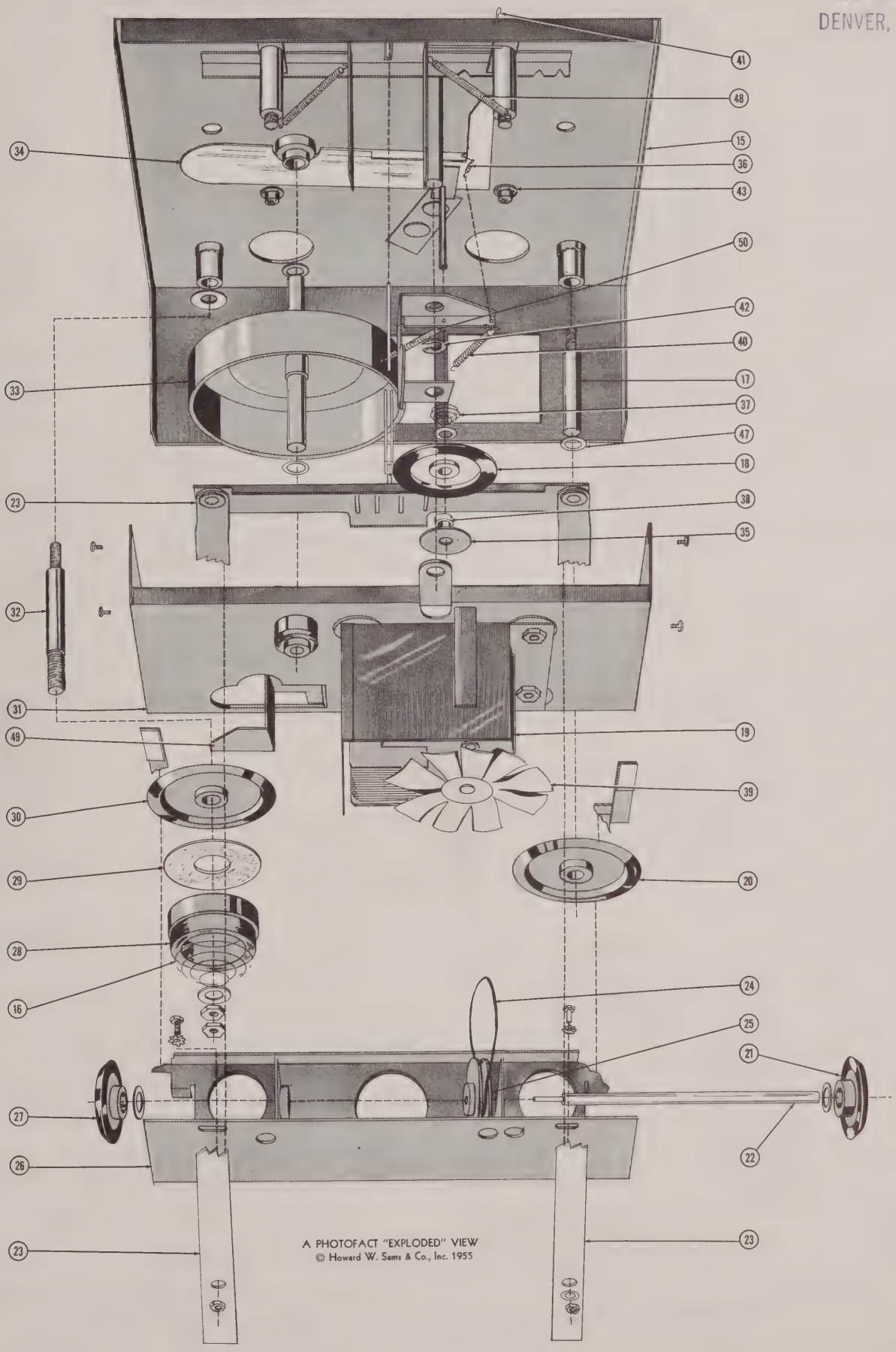

Figure 7B. Exploded View Of Parts Below Baseplate.

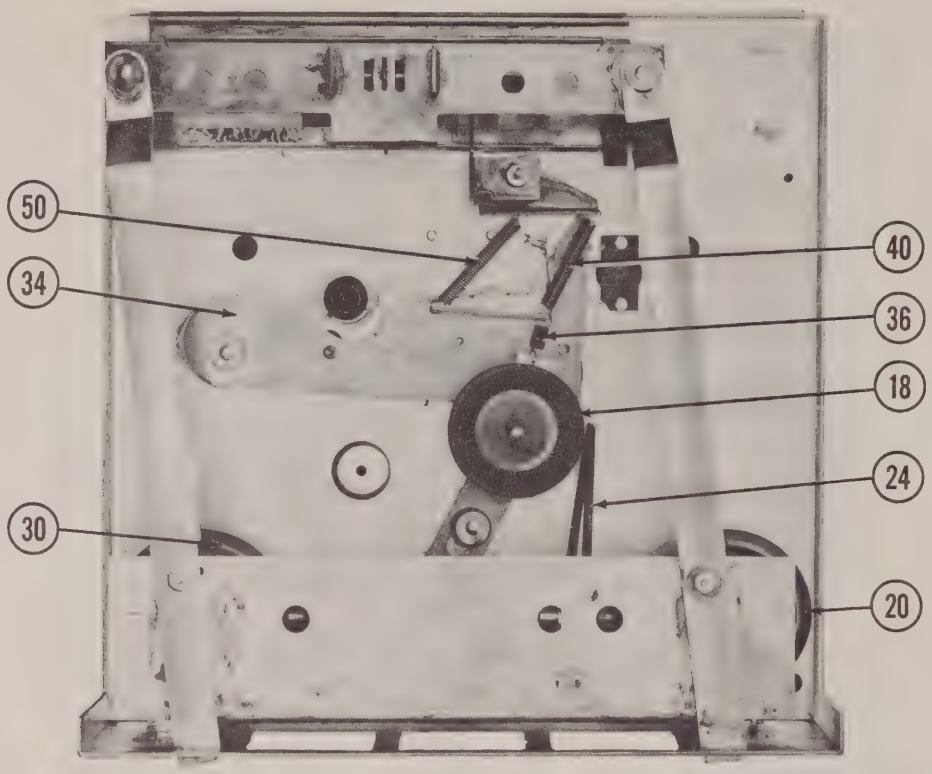

Figure 8

plate (30), felt washer (29), clutch plate (28), and spring (16).

(b)Tighten spindle plate set screw after adjusting the spindle for free movement without excessive end play.

(c)Put clutch plate (28) and spring (16) in place and add washer and two clutch adjustment nuts. Adjust clutch for very light engagement (nuts should be at low end of shaft and tightened against each other).

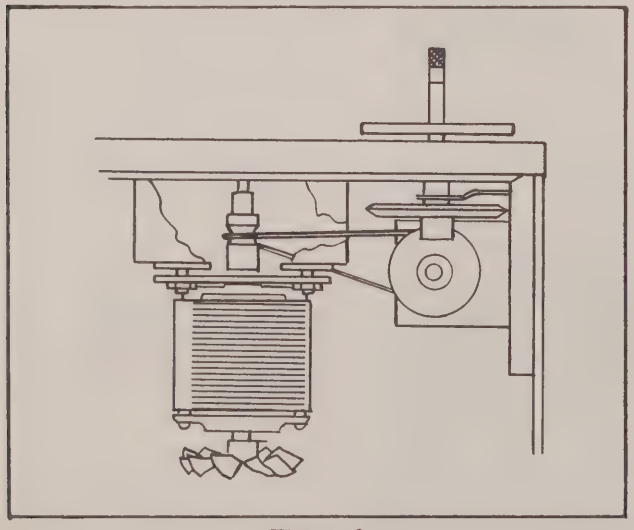

Figure 9

TROUBLES

Speed Variation or "Wow"-

1. Check for oil on all driving surfaces. If any of the rubber drive wheels have oil on their surfaces clean with a petroleum solvent, not carbon tetrachloride.

2. Take-up clutch improperly adjusted. Adjust as described under "To Replace Belts".

3. Check all rollers and shafts for binding. If parts bind, clean bearings and lubricate with a good light oil.

Won't Take Up Tape Properly-

1. Set screw loose in clutch plate (30). Tighten screw and adjust clutch as described under "To Replace Belts".

2. Belt (24) slipping. Clean motor pulley, drive pulley (25), and belt (24).

3. Belt (24) loose or broken. Replace belt as described under "To Replace Belts".

Fast Forward Won't Function Properly-

1. Check rubber drive wheel (27) for oil on driving surface. If this condition exists clean drive wheel (27) and clutch plate (30) with a petroleum solvent.

2. Check feed reel spindle (17) and take-up spindle (32) for binding. Clean and lubricate if necessary.

3. Springs (50) disconnected or broken.

Rewind Won't Function Properly-

1. Check rubber drive wheel (21) for oil on drive surface. Clean drive wheel (21) and rewind drive plate (20) with a petroleum solvent.

2. Check feed reel spindle (17) and take-up spindle (32) for binding. Clean and lubricate if necessary.

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3. Drive shaft (22) binding or improperly adjusted. Clean bearings, lubricate, and adjust as described under "To Replace Belts".

4. Springs (50) disconnected or broken.

No Drive In "Play" or "Record" Position-

1. Idler wheel actuating spring (40) broken or disconnected. If this is the case, idler wheel (18) will not be pulled into engagement with the motor pulley and flywheel when the recorder is placed in the "Play" or "Record" position.

2. Pressure roller actuating spring (50) broken or disconnected. If so, pressure roller (11) will not be pulled into engagement with the capstan when the recorder is placed in the "Play" or "Record" position.

3. Check for oil on pressure roller (11), flywheel (33), idler wheel (18), and motor pulley. Clean with a petroleum solvent.

High Background Noise (Hiss)-

1. Tape recorded at too low a level. When recording, volume control should be advanced just far enough to cause the Neon Record Level Indicator to flash on peak passages.

2. Play-record head lamination dirty. Use a soft cloth and alcohol to clean the lamination.

3. Defective play-record head. Replace.

4. Play-record head magnetized. Demagnetize with a 60 cycle A. C. air core coil.

Incomplete Erase-

1. Tape recorded at too high a level.

2. Erase voltage too low.

3. Erase head lamination dirty. Clean with a soft cloth and alcohol.

4. Erase head open. Replace.

5. Check play-record switch in amplifier for poor contact.

Poor High Frequency Response-

1. Head gap not at right angles to tape. Align head as described under "Play-Record Head Adjustment".

2. Defective play-record head. Replace.

3. Play-record head lamination worn. Replace as described under "To Replace Head Laminations".

4. Check to see that pressure pad holds tape in firm but not excessive contact with play-record head.

LUBRICATION

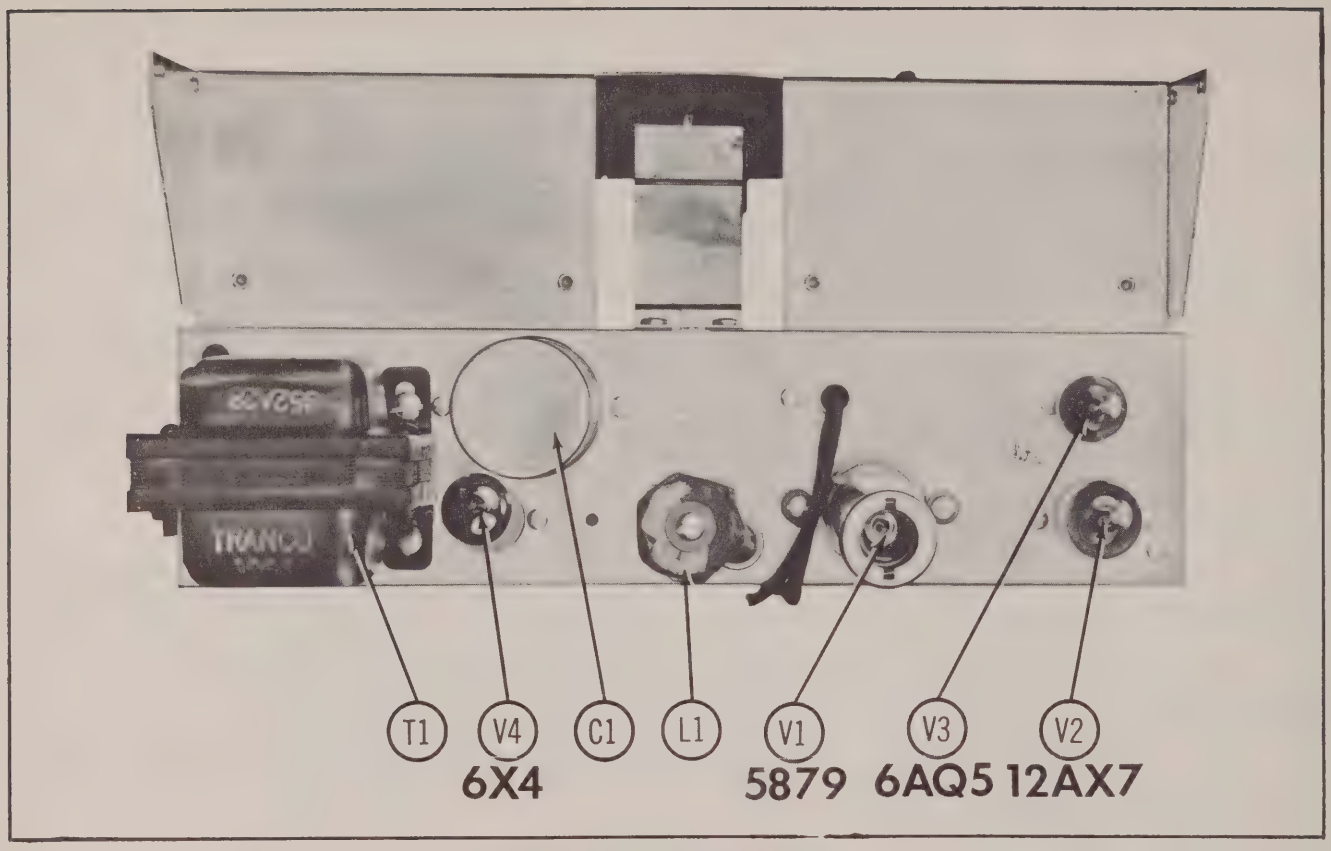
All rotating parts are provided with oilite bearings which are factory lubricated and should require no further attention. In case some of the spindles or shafts become sluggish to respond, clean with a soft cloth and lubricate with a drop of #10 motor oil.

If any of the sliding lever members fail to operate smoothly, apply a thin film of Lubriplate at the pivot points.

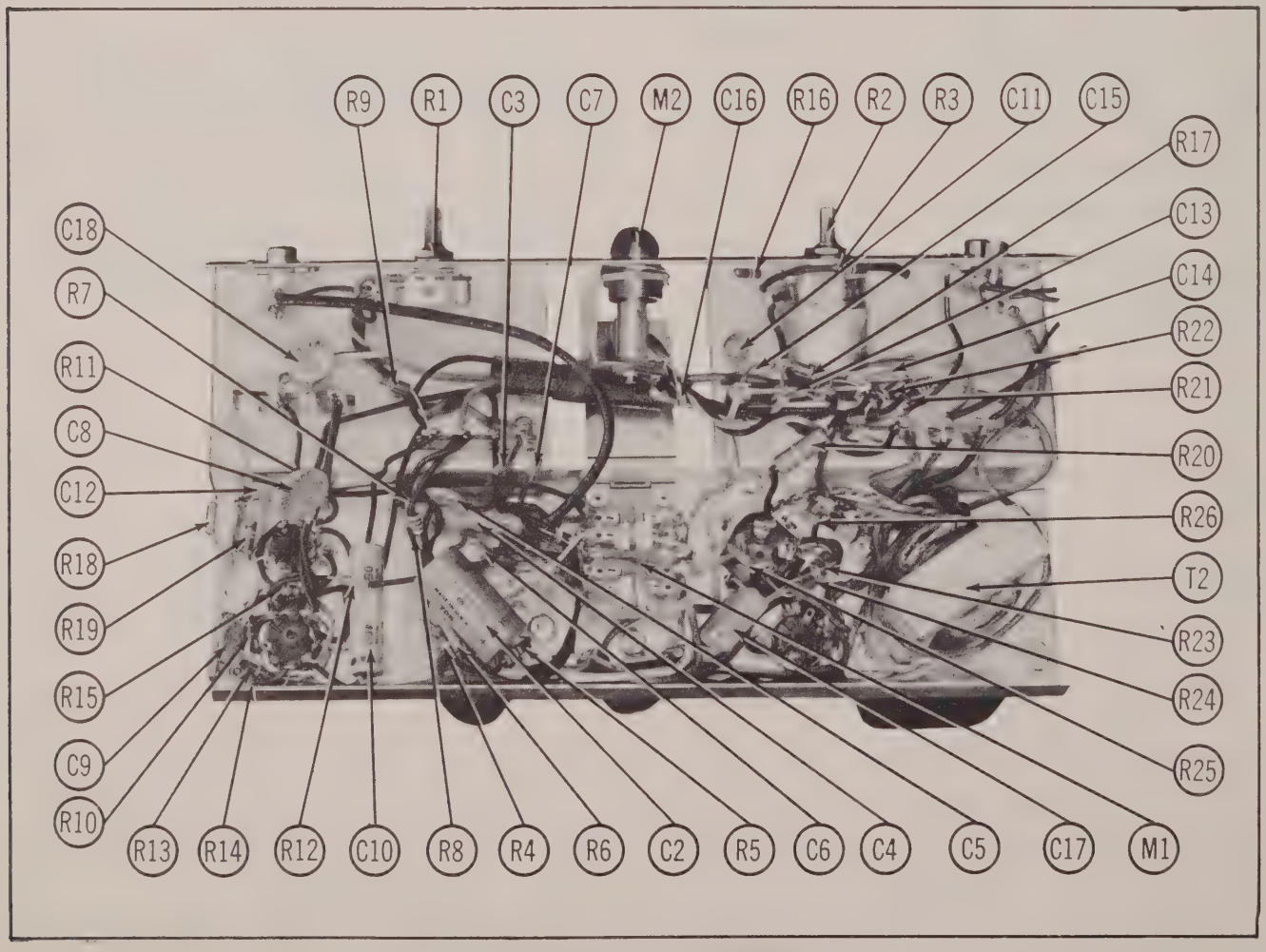
CLEANING

The play-record head lamination, erase head lamination, capstan, and pressure roller (11) are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. This can cause distortion, weak output, and poor erasure. An occasional cleaning with a soft cloth and alcohol will keep the above mentioned parts in good working order.

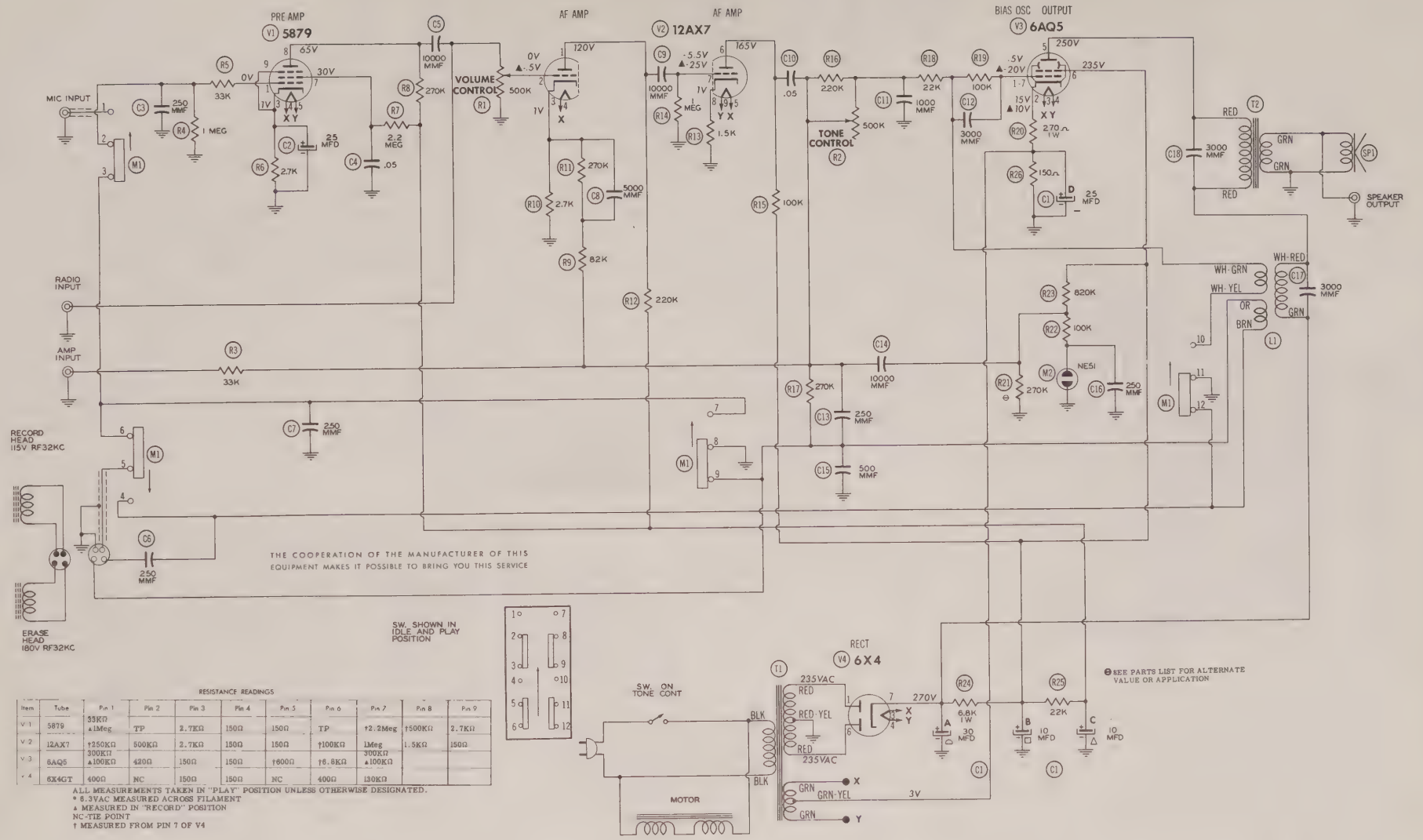
CAUTION: Do not use a brush or any metallic object when cleaning the record or erase head as this could damage the laminations.



TOP VIEW OF AMPLIFIER



BOTTOM VIEW OF AMPLIFIER



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V-1	5879	33KΩ ▲1Meg	TP	2.7KΩ	150Ω	150Ω	TP	†2.2Meg	†500KΩ	2.7KΩ
V-2	12AX7	†250KΩ	500KΩ	2.7KΩ	150Ω	150Ω	†100KΩ	1Meg	1.5KΩ	150Ω
V-3	6AQ5	300KΩ ▲100KΩ	420Ω	150Ω	150Ω	†600Ω	†6.8KΩ	300KΩ ▲100KΩ		
V-4	6X4GT	400Ω	NC	150Ω	150Ω	NC	400Ω	130KΩ		

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.
* 6.3VAC MEASURED ACROSS FILAMENT
▲ MEASURED IN "RECORD" POSITION
NC-TIE POINT
† MEASURED FROM PIN 7 OF V4

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294-8

PENTRON
MODEL CT-1

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	714-A-276	Spindle Cap	26		Drive Mechanism Bracket
2	711-A-422	Reel Support	27	964-A-163	Wind Drive Wheel
3	824-A-10	Record Lock Button	28	964-B-59	Clutch Plate Assembly
4		Rear Trim Cover	29	871-A-32	Clutch Backing Felt
5	711-A-495	Lock Button Retainer	30	711-A-476	Spindle Plate
6	824-A-9	Function Control Knob	31		Motor Mounting Bracket
7	765-D-17	Front Trim Cover	32	714-338	Take-up Spindle
8		Top Panel	33		Flywheel & Capstan Assembly
9		Rear Trim Cover Mtg. Bracket	34		Pressure Roller Actuating Lever
10		Amplifier Control Knobs	35	616-A-16	Idler Washer
11	964-A-116	Pressure Roller	36	711-A-438	Idler Engagement Spring
12	964-B-1	Record Head	37	712-A-41	Idler Lift Spring
13	871-A-30	Pressure Pad	38	714-A-291	Idler Spacer
14	964-B-2	Erase Head	39	717-B-11	Motor Fan
15		Mechanism Plate	40		Idler Actuating Spring
16	712-A-43	Clutch Compression Spring	41	619-A-22	Hair Pin Clip
17	714-339	Feed Reel Spindle	42	619-A-20	"E" Ring
18	964-A-130	Idler Wheel	43	851-A-8	Rubber Bumper
19		Motor	44	619-A-21	1/8" Retaining Ring
20	711-A-476	Rewind Drive Plate	45	616-A-720-9	Steel Washer, 5/16 x 5/8 x .010
21	964-A-163	Rewind Drive Wheel	46		Steel Washer, 1/4 x 1/2 x .010
22		Drive Shaft	47	616-A-714-9	Steel Washer, 5/16 x 7/16 x .010
23	711-A-429	Connecting Arm Assembly	48	712-A-12	Actuator Control Spring
24	854-A-17	Drive Belt	49		Speed Change Lever
25	764-A-27	Drive Pulley	50		Pressure Roller Actuating Spring

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	5879	Pre-Amp.	R5		Resistor 33K@1/2 W.
V2	12AX7	AF Amp.	R6		Resistor 2.7K@1/2 W.
V3	6AQ5	Bias Osc. -Output	R7		Resistor 2.2Meg @1/2 W.
V4	6X4	Rectifier	R8		Resistor 470K@1/2 W.
C1A		Elect. Cap., 30MFD@350V.	R9		Resistor 82K@1/2 W.
C1B		Elect. Cap., 10MFD@350V.	R10		Resistor 2.7K@1/2 W.
C1C		Elect. Cap., 10MFD@350V.	R11		Resistor 270K@1/2 W.
C1D		Elect. Cap., 25MFD@25V.	R12		Resistor 220K@1/2 W.
C2		Elect. Cap., 25MFD@25V.	R13		Resistor 1.5K@1/2 W.
C3		Cap., Ceramic, 250MMF, 10%	R14		Resistor 1 Meg@1/2 W.
C4		Cap., Molded Paper, .05MFD@ 400V.	R15		Resistor 100K@1/2 W.
			R16		Resistor 220K@1/2 W.
C5		Cap., Ceramic, 10,000MMF, 20%	R17		Resistor 270K@1/2 W.
C6		Cap., Ceramic, 250MMF, 20%	R18		Resistor 22K@1/2 W.
C7		Cap., Ceramic, 250MMF, 10%	R19		Resistor 100K@1/2 W.
C8		Cap., Ceramic, 5000MMF, 20%	R20		Resistor 270Ω@1 W.
C9		Cap., Ceramic, 10,000MMF, 20%	R21		Resistor 270K@1/2 W. (Note-R21
C10		Cap., Molded Paper, .05MFD@ 400V.			Selected To Give Correct Neon Lamp(NE51) Operation. Range 270K to 390K
C11		Cap., Ceramic, 1000MMF, 20%			
C12		Cap., Ceramic, 3000MMF, 20%	R22		Resistor 100K@1/2 W.
C13		Cap., Ceramic, 250MMF, 10%	R23		Resistor 820K@1/2 W.
C14		Cap., Ceramic, 10000MMF, 20%	R24		Resistor 6.8K@1 W.
C15		Cap., Ceramic, 500MMF, 20%	R25		Resistor 22K@1/2 W.
C16		Cap., Ceramic, 250MMF, 10%	R26		Resistor 150Ω@1/2 W.
C17		Cap., Ceramic, 3000 MMF	L1	311-13	Bias Osc. Coil
C18		Cap., Ceramic, 3000MMF, 20%	T1	352-28	Power Transformer
R1		Vol. Cont. 500K	T2	342-12	Output Transformer
R2		Tone Cont. And Sw. Assy. 500K	M1	534A3	Slide Switch
R3		Resistor 33K@1/2 W.	M2		Neon Lamp NE51
R4		Resistor 1 Meg@1/2 W.	SP1		Speaker

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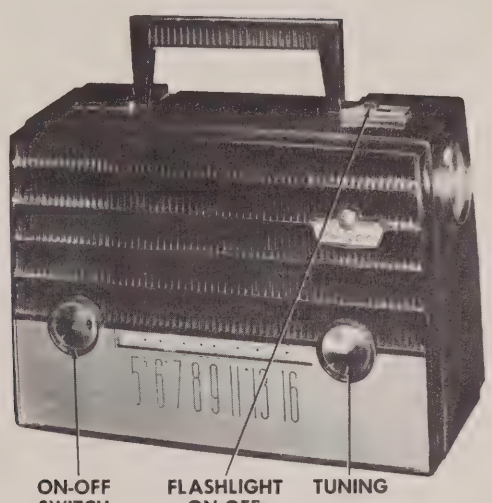

TRADE NAME	Philco Model C-666 (Codes 121 & 125)
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Five)	Types 1T4 RF Amp., 1R5 Conv., 1U4 IF Amp., 1U5 Det. -AVC-AF Amp., 3V4 Output
POWER SUPPLY RATINGS	110-120 Volts AC-DC (or) 9 Volts "A" Supply & 90 Volts "B" Supply .120 Amp. @ 117 Volts AC (or) 50MA @ 9 Volts DC & 13.5MA @ 90 Volts DC
TUNING RANGE—BROADCAST	540KC-1620KC

AM ALIGNMENT (CODE 121)

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V2). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. IF AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1630KC	" *	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	1500KC	"	A6, A7	"
4.		"	580KC	580KC	"	A8	"

AM ALIGNMENT (CODE 125)

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

1.	.1MFD	High side to pin 6 (grid) of 1R5 (V2). Low side to chassis.	265KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. IF AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1630KC	" *	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	580KC	580KC	"	A6, A7	Adjust for maximum output. Rock tuning gang while adjusting A6.
4.		"	1500KC	1500KC	"	A8	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

*With tuning gang fully open insert .006 shim between heel of rotor & top of stator plates. Close gang enough to hold shim in place. Carefully remove shim so as to not disturb setting. Continue alignment.

DIAL POINTER ALIGNMENT (CODE 125)

Set pointer 1/8" to right of first index mark from left side of dial back plate (gang closed).

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	1T4	1T4	6AR	
V2	Converter	1R5	1R5	7AT	
V3	IF Amplifier	1U4	1U4	6AR	
V4	Det.-AVC-AF Amp	1U5	1U5	6BW	
V5	Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	▲60	150	30-2568-58	FP410.7	TM-4119	T-345 / FMT-1520	
B	■10	150					
C	▲60	150					
D	60	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C2	10	500		TCZ-10	NP0A-100	ZT-541	
C3	100			D6-101	801-101	ZT-531	
C4	4.7			TCZ-4R7	NP0A-4R7	ZT-5547	
C5	.05	400		DF-503		PT415	
C6	.05	200		DF-503		PT415	
C7	1.5			TCZ-1R5	NP0A-1R5	ZT-5515	
C8	.05	200		DF-503		PT415	
C9	47			D6-470	GP1K-470	UC-5447	
C10	.003	600		D6-302	GP2-333-302	PT623	
C11	100			D6-101	GP1K-101	UC-531	
C12A	1000		♦	DD-102	811-102	DC-521	
B	10000		♦	DD-103	811-01	DC-511	
C	200		♦	DD-201	811-201	UC-532	
D	2000		♦	DD-202	801-102	DC-522	
C13	.004	600		D6-402	GP2-333-402	PT624	
C14	.1	200		DF-104		PT401	
C15	.1	200		DF-104		PT401	
C16	.1	200		DF-104		PT401	
C17	47000	500		DF-503		PT4147	

♦ Items C12A, C12B, C12C, C12D are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	33-5566-11	Q13-137	A47-1Meg-S	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

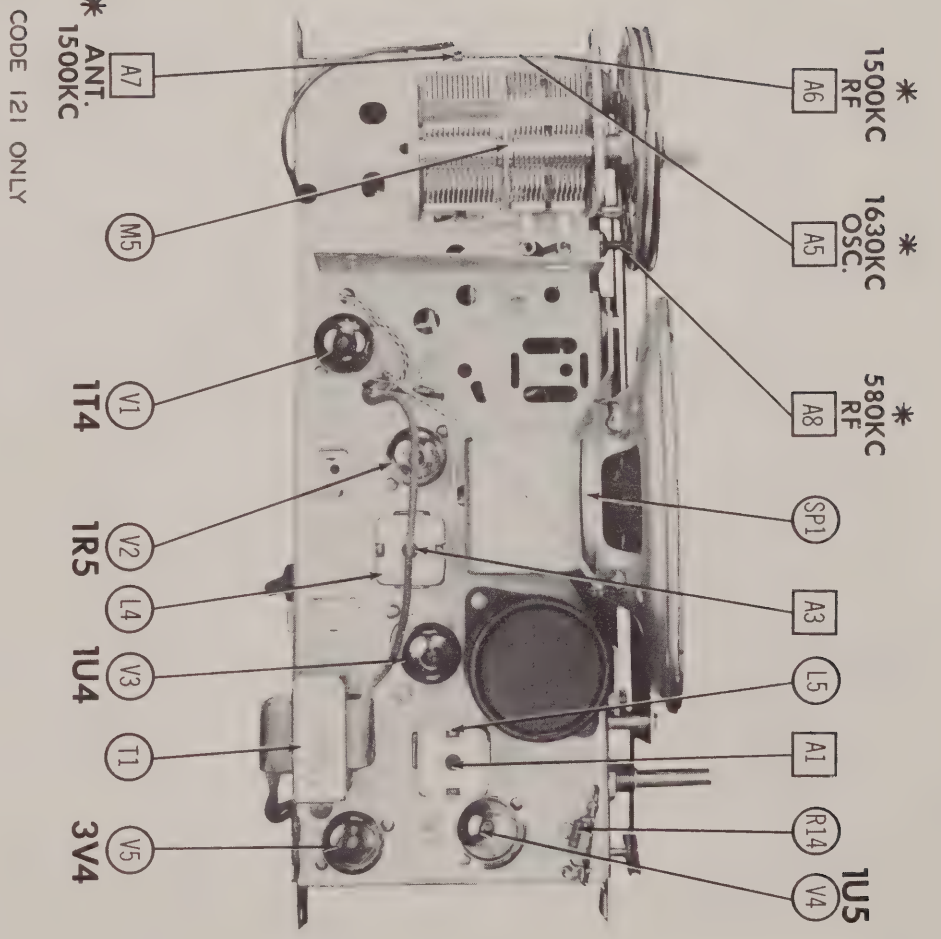
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	2.2Meg	½	66-5228340	BTS-2.2Meg	
R3	100Ω	½	66-1108340	BTS-100	
R4	150KΩ	½	66-4158340	BTS-150K	
R5	4.7Meg	½	66-5478340	BTS-4.7Meg	
R6	100KΩ	½	66-4108340	BTS-100K	
R7	1500Ω	½	66-2158340	BTS-1500	
R8	4.7Meg	½	66-5478340	BTS-4.7Meg	
R9	15KΩ	½	66-3158340	BTS-15K	
R10	330Ω	½	66-1338340	BTS-330	Note 1
R11	560Ω	½	66-1568340	BTS-560	Note 2
R12	2200Ω	½	66-2228340	BTS-2200	
R13	100KΩ	½	66-4108340	BTS-100K	
R14	4.7Meg	½	66-5478340	BTS-4.7Meg	
R15	4.7Meg	½	66-5478340	BTS-4.7Meg	
R16	4.7Meg	½	66-5478340	BTS-4.7Meg	
R17	680KΩ	½	66-4688340	BTS-680K	
R18	82Ω	½	66-0828340	BTS-82	
R19	3.3Meg	½	66-5338340	BTS-3.3Meg	
R20	3.3Meg	½	66-5338340	BTS-3.3Meg	
R21	330Ω	½	66-1338340	BTS-330	
R22	330Ω	½	66-1338340	BTS-330	
R23	15KΩ	½	66-3158340	BTS-15K	
R24	120Ω	2	33-1334-14		
R25A	950Ω	10	♦33-3431-7		
B	950Ω	10	♦33-3431-7		
R26	1000Ω	½	66-2108340	BTS-1000	

♦ Items R25A, R25B are combined in one unit.

Note 1. Code #125 uses 82Ω resistor in this application.

Note 2. Code #125 uses 220Ω resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	9KΩ	3.3Ω	32-8528	Z1116 ①	A-2927 ①	A-3329	24S49	S-11X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	QUAM PART No.	NOTES
SP1	5"	PM	3.3Ω	36-1625	5A1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	MEISSNER - PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.3Ω		32-4455-14				
L2	RF Coil	85Ω	9.5Ω*	32-4624-2	14-1076			* Tapped @ 6Ω
L3	Osc. Coil	2.5Ω	8.3Ω	32-4263-7	14-1074	BC-394	70-OSC	
L4	Input IF	11Ω	11Ω	32-4160A	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	32-4240-9A	16-6770	BC-355	12-C6	

SELENIUM RECTIFIER

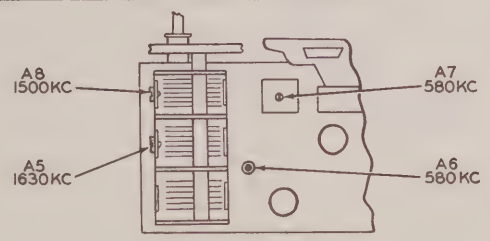
ITEM No.	RATING CURRENT	REPLACEMENT DATA PHILCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.066ADC	34-8003	1003A	RS075	6S75	5M4	75	

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M2	9V "A" 90V "B"	P-274			756			T6Z60	
M3	3V (Flash-light)	P-912	#635			#1			Connect 2 in series

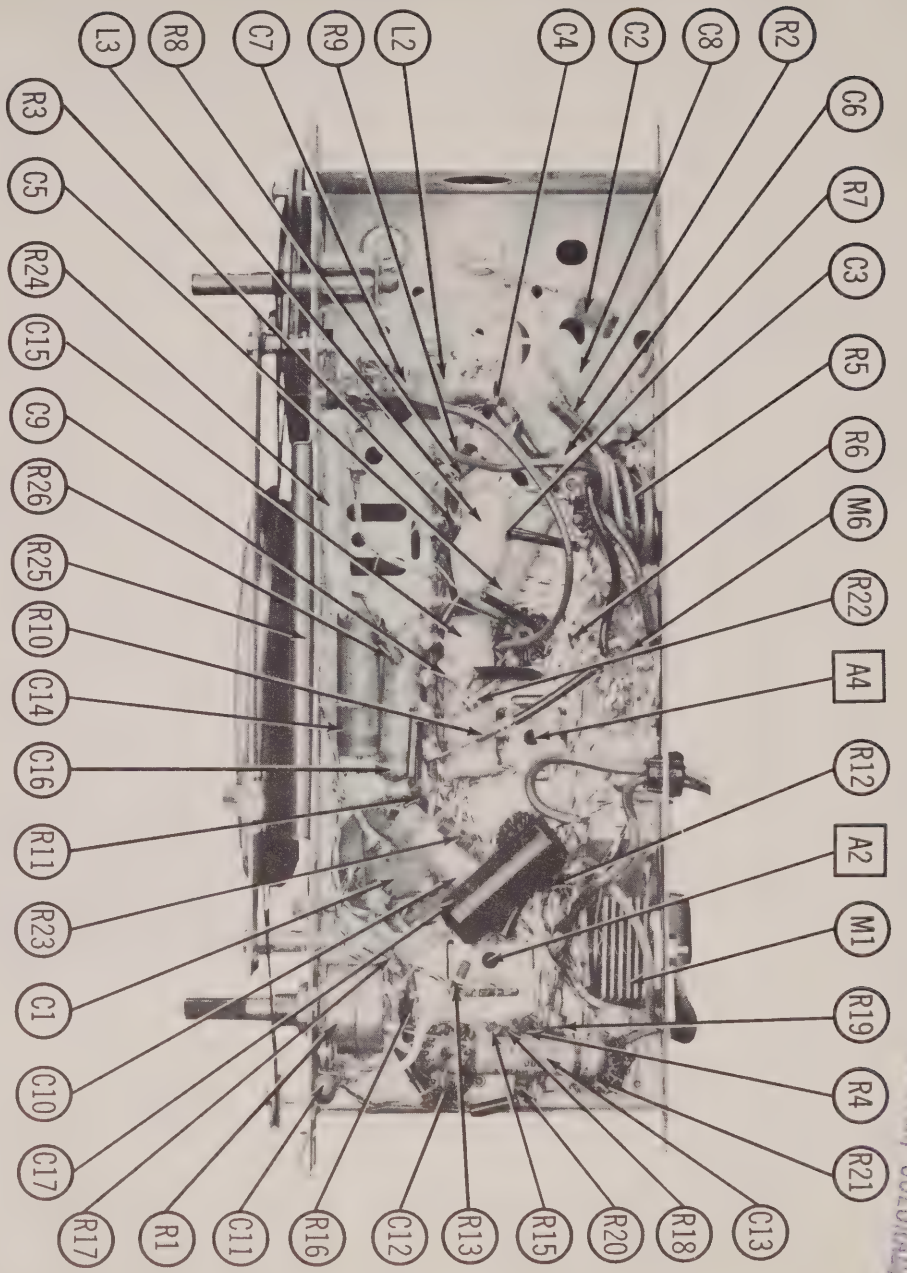
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M4	Flashlight	3463-3	Type PR-14 (Double Filament)
M5	Tuning Cap.	31-2779	3 Gang (26-485MMF, 13-200MMF, 13-115MMF)
M6	Switch	42-1899	Power Changeover (4PDT)
M7	Switch	42-2038	Flashlight - (SP- 3 Position)
	Cabinet	11054	Maroon
	Handle	54-6131	
	Knob	54-6093-2	On-off-volume and tuning
	Dial Backplate Assembly	76-9101	
	Dial Pointer	56-8774-1	
	Dial Scale	28-10091	
	Window Dial Scale	54-6134	
	Lens	54-5206	Glass, Flashlight



RF TRIMMER LOCATION - CODE 125 ONLY

CHASSIS—BOTTOM VIEW



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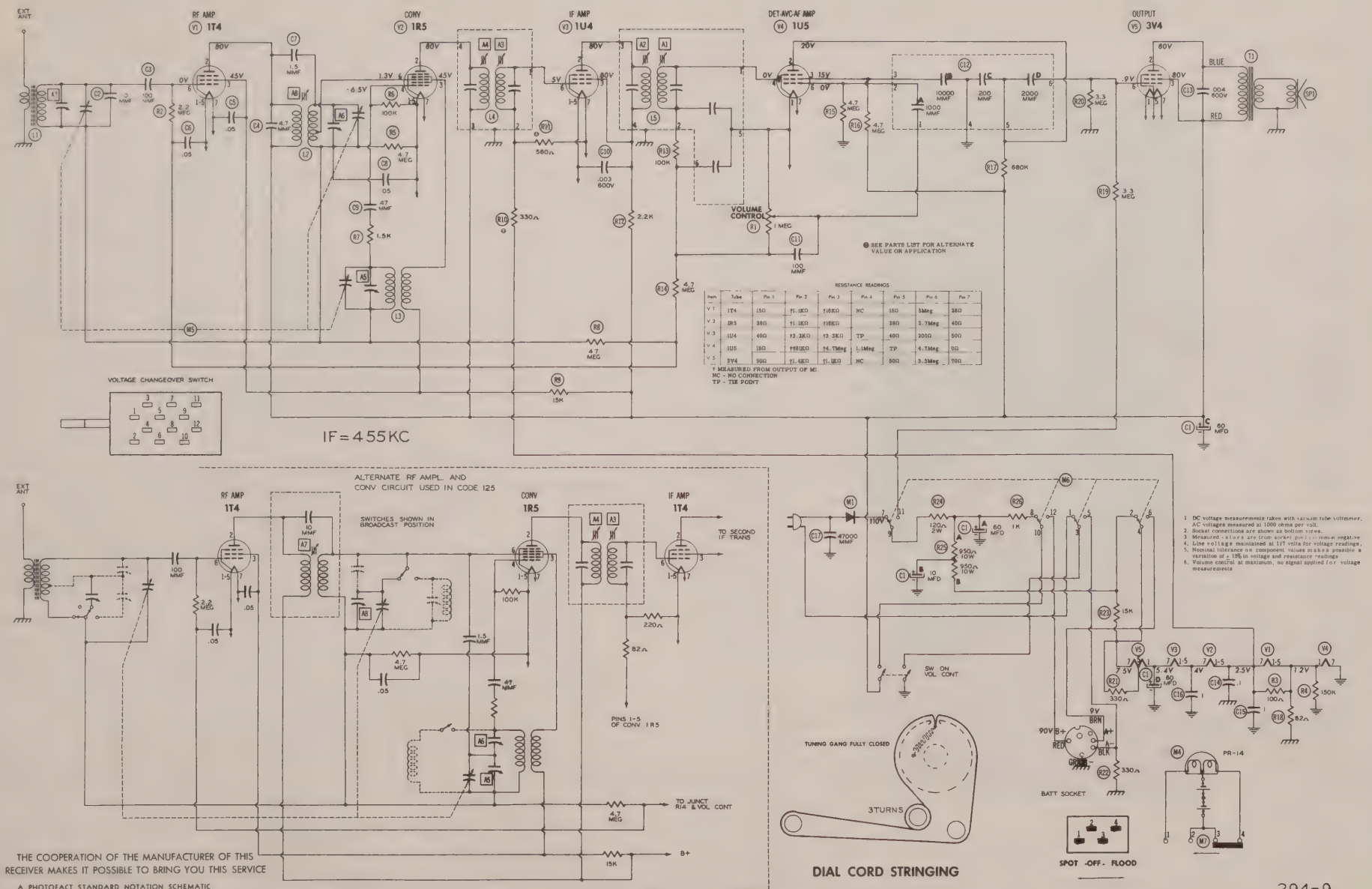
EXT ANT
RF AMP V1 1T4
CONV V2 1R5
IF AMP V3 1U4
DET-AVC-AF AMP V4 1U5
OUTPUT V5 3V4
VOLUME CONTROL
VOLTAGE CHANGEOVER SWITCH
IF=455KC
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
RESISTANCE READINGS
† MEASURED FROM OUTPUT OF M1
NC - NO CONNECTION
TP - TIE POINT
ALTERNATE RF AMPL. AND CONV CIRCUIT USED IN CODE 125
SWITCHES SHOWN IN BROADCAST POSITION
TO SECOND IF TRANS
PINS 1-5 OF CONV 1R5
TO JUNCT R14 & VOL CONT
B+
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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1 DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3 Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements
TUNING GANG FULLY CLOSED
3TURNS
DIAL CORD STRINGING
SW ON VOL CONT
BATT SOCKET
PR-14
SPOT -OFF- FLOOD
294-9

PHOTOFACT* Folder

RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

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MODEL 17-S-450R

RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

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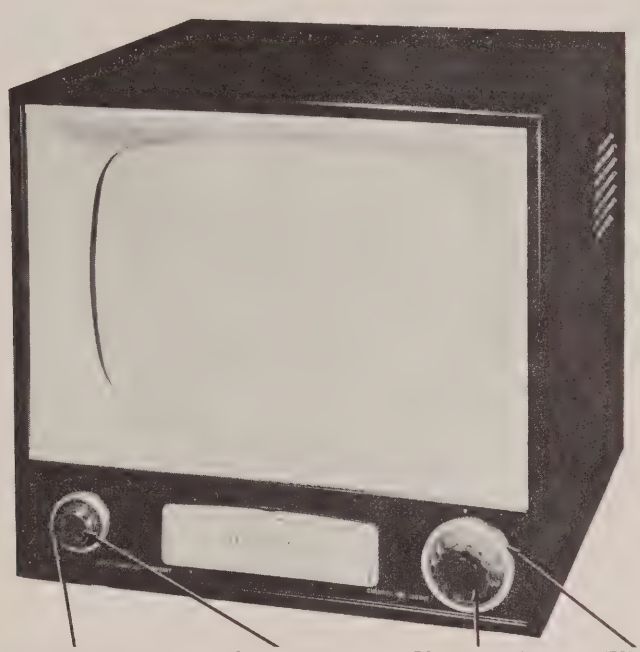

RCA VICTOR MODEL 17-S-450R

TRADE NAME	RCA Victor	MODELS	CHASSIS	TUNER
		17-S-450R, 17-S-451R, 17-S-453R 17-S-450RU, 17-S-451RU,	KCS93	KRK32A
		17-S-453RU	KCS93A	KRK33A
		21-S-500R	KCS93B	KRK32A
		21-S-500RU	KCS93C	KRK33

MANUFACTURER	Radio Corp. of America, RCA Victor Television Div., Camden 2, N.J.
TYPE SET	Television Receiver
TUBES	Eighteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.35 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions ..... 5 thru 9
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 13
Parts List and Descriptions ..... 15 thru 18
Photographs
Cabinet-Rear View 13
Capacitor Identification..... 12, 21
Chassis-Top View 3
RF Tuner 4, 9
Resistor Identification 23, 24
Sound IF Sub-Chassis (Printed Circuit) 19
Photographs (Cont)
Trans., Inductor & Alignment Identification 3
Video IF Sub-Chassis (Printed Circuit) 19
Resistance Measurements 11
Servicing in the Field 22
Schematic (Alternate Tuner) 20
Schematic (TV) 2
Trouble Shooting Aids 14, 19
Tube Failure Check Chart 10
Tube Placement Chart (Bottom View) 11
Tube Placement Chart (Top View) 10

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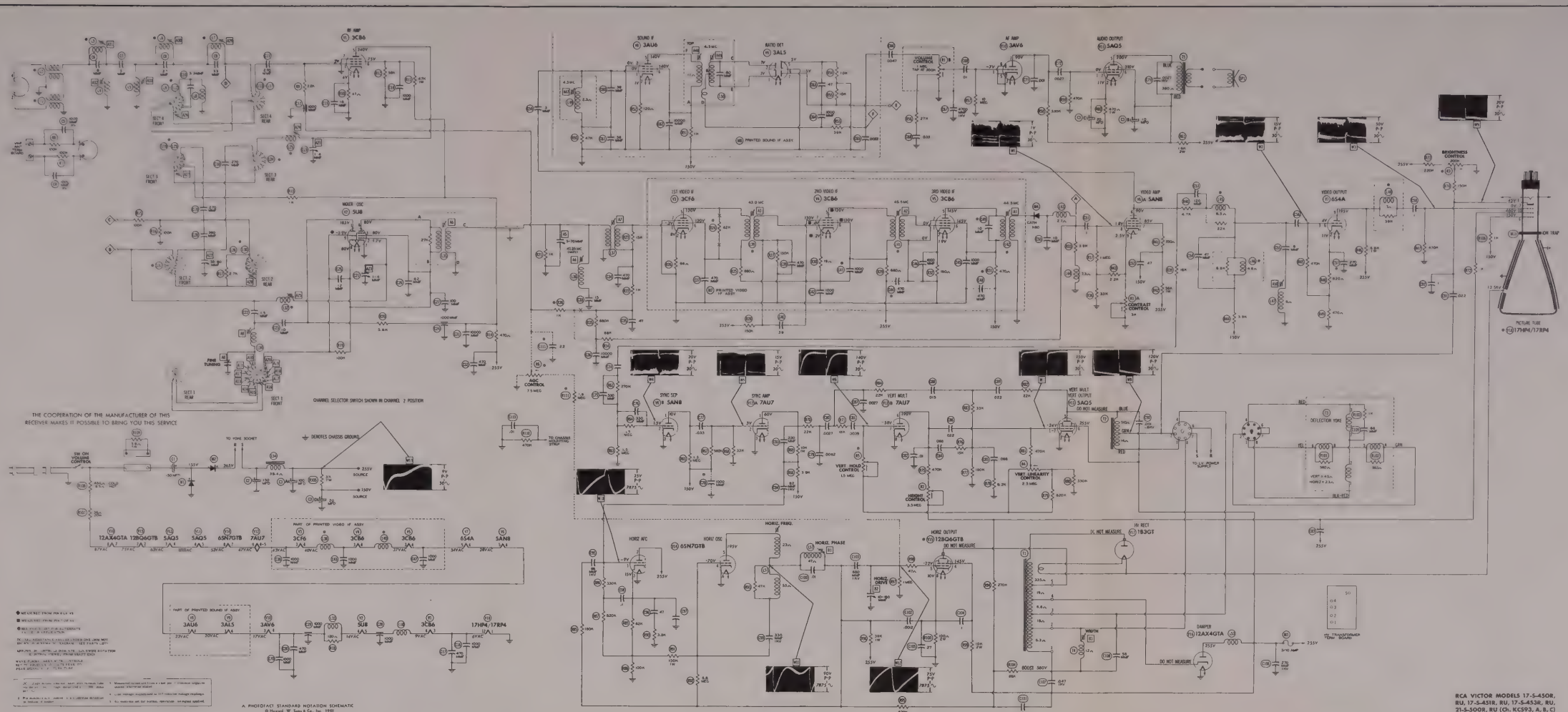
RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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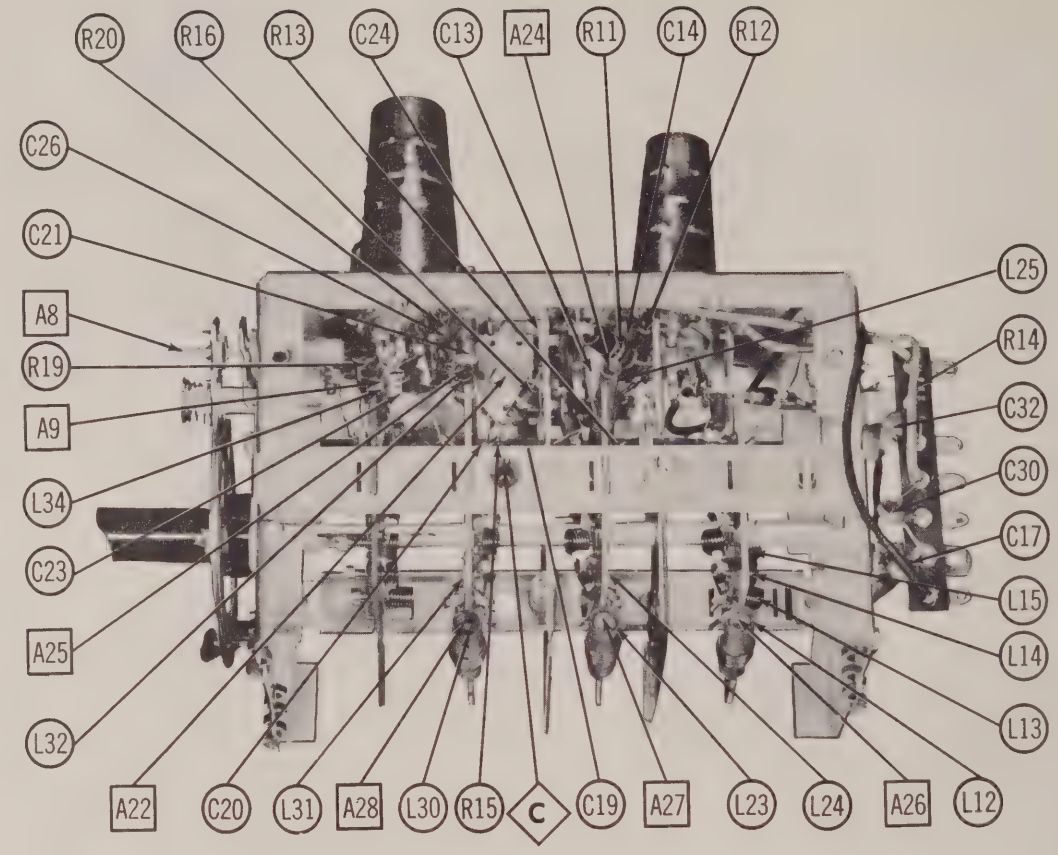
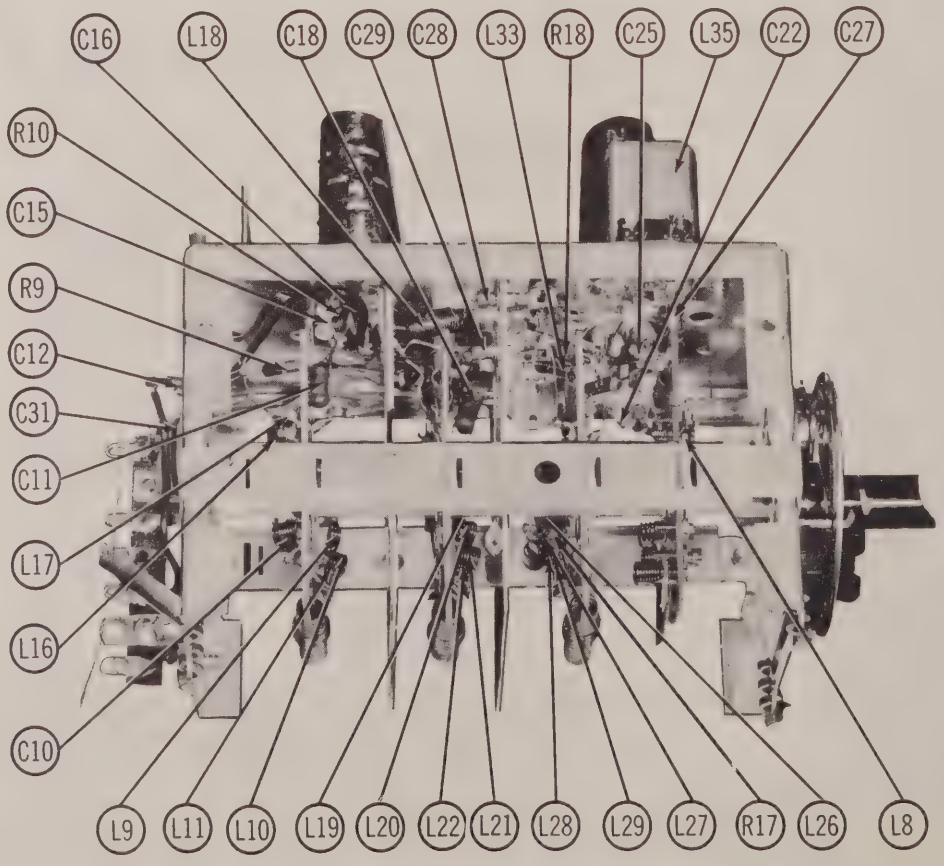
CHASSIS-BOTTOM VIEW

CHASSIS TOP VIEW



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from the chassis. Connect yoke and picture tube plugs to chassis sockets.

VIDEO IF ALIGNMENT FOR MODELS 17-S-450R, 17-S-451R, 17-S-453R & 21-S-500R

Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain. Connect the positive terminal to chassis. Connect the potentiometer arm to the ungrounded side of C35. Set the potentiometer arm for -4 volts at ungrounded side of C35.
Attenuate the signal generator output to maintain not more than-3 volts at VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD Ceramic Capacitor	High side to point Ⓑ. Low side to tuner chassis top. Use very short leads	Not used	44.5MC	Any non-interfering channel	Use VTVM. DC probe to point Ⓐ. Common to chassis.	A1	Adjust for maximum deflection (final adjustment should leave core nearest chassis end of coil).
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Adjust for MINIMUM deflection (final adjustment should leave core near chassis end of coil).
5.	"	"	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. thru detector (Fig. 3) to pin 5 (plate) of V3 (3CF6). Low side to chassis.	A5, A6, A7	Preset A5 to MINIMUM capacity. Connect a 180Ω carbon resistor from pin 5 (plate) to pin 6 (screen) of V3 (3CF6). Couple signal generator loosely to the detector (Fig. 3) to provide markers. Adjust A6 and A7 for maximum amplitude response curve with 45.75MC at 75% as in Fig. 1. Attenuate sweep generator output to maintain .3 to .5 volts peak to peak on scope for final adjustment. Adjust A5 to place 42.5MC marker at 70%. Remove 180Ω from pins 5 and 6 of V3. Disconnect detector probe from pin 5 of V3 and remove scope connection.
6.	"	"	"	41.25MC 42.5MC 45.0MC 45.75MC	4	Vert. Amp. to point Ⓐ. Low side to chassis.		Attenuate sweep generator output to maintain five volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amp. to provide markers on response curve. SLIGHTLY retouch A1, A2 and A3 for response similar to Fig. 2. Increase sweep generator output to view 41.25MC marker. If necessary retouch A1 and A3 to place 41.25MC as shown in Fig. 2.
7.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	69MC (10MC Swp)	"	"	"		Retouch A1 and A2 to correct any overall tilt while switching from channel to channel. Continue alignment with step 10.

VIDEO IF ALIGNMENT FOR MODELS 17-S-450RU, 17-S-451RU, 17-S-453RU & 21-S-500RU

Same instructions as under "Video IF Alignment" for 17-S-450R, 17-S-451R, 17-S-453R and 21-S-500R.

Follow steps 1 thru 6 above.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	1000Ω Carbon Resistor in series with .0015 MFD ceramic capacitor	High side thru dummy antenna to front terminal of 1N82 crystal holder (remove crystal cover and connect resistor end of dummy to crystal front terminal. Insulate resistor lead). Low side to tuner chassis. Use very short leads.	44MC (10MC Swp)	41.25MC 45.75MC	Between channels 68 & 69	Vert. Amp. thru detector (Fig.3) to junction of 220Ω resistor and .0015MFD capacitor between pin 1 of 4BQ7A and chassis. (See remarks) Low side to chassis.	A34, A35, A36, A37	Set change-over switch to "UHF" position. Connect a 220Ω carbon resistor and a .0015MFD capacitor in series from pin 1 (plate) of 4BQ7A to chassis. Couple the signal generator loosely to the detector probe (Fig.3) to provide markers. Connect the potentiometer arm of a second bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust for -3 volts at tuner AGC terminal. Attenuate sweep generator output to maintain not more than .5 volts peak to peak on scope. Adjust A34, A35 for maximum amplitude response curve similar to Fig. 6. Connect scope thru detector (Fig.3) to point Ⓖ and chassis. Adjust A36 and A37 for response similar to Fig. 6. Remove 220Ω resistor and .0015MFD capacitor from pin 1 of 4BQ7A.
8.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	41.25MC 42.5MC 45.0MC 45.75MC	13	Vert. Amp. to point Ⓐ. Low side to chassis.		Attenuate generator output to maintain 3 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amplifier to provide markers. Check for response similar to Fig. 2. If necessary SLIGHTLY retouch A1 and A2 to correct for any overall tilt.
			207MC (10MC Swp)	"	12			
			201MC (10MC Swp)	"	11			
			195MC (10MC Swp)	"	10			
			189MC (10MC Swp)	"	9			
			183MC (10MC Swp)	"	8			
			177MC (10MC Swp)	"	7			
			85MC (10MC Swp)	"	6			
			79MC (10MC Swp)	"	5			
			69MC (10MC Swp)	"	4			
			63MC (10MC Swp)	"	3			
			57MC (10MC Swp)	"	2			

9. Remove VHF sweep generator and connect UHF sweep generator to antenna terminals. Check all UHF channels for response similar to Fig. 2. If necessary SLIGHTLY retouch A34 and A35 to correct any overall tilt. Disconnect generators and bias supplies. Continue alignment with step 21.

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ALIGNMENT INSTRUCTIONS (cont)

TUNER ALIGNMENT FOR KRK32A

A tuner unit which is operative and requires only minor touch-up adjustments will require no pre-setting of adjustments. When complete alignment is necessary make the following adjustments.
Adjust A8 so that the slug is all the way out. Set channel 7 to 13 oscillator slugs one turn from tight. Disconnect the link from terminals of L35 on tuner and terminate the link with a 39Ω carbon resistor. Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect positive lead to chassis. Adjust the potentiometer arm for -3.5 volts at tuner AGC terminal. Tuner alignment as outlined below requires the use of a heterodyne frequency meter.
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.		RF input of heterodyne meter to end of insulated wire inserted thru hole provided for adjustment of A22.	Not used	Set Freq. meter to 227MC	8	Not used	A8	Turn fine tuning control to its mid-range position. Adjust A8 for audible beat on freq. meter. (limits of oscillator injection voltage are 2 - 5.5 volts).
11.	If channel oscillator frequency cannot be reached by adjustment of A8 switch to channel 13 and adjust A9 for channel 13 oscillator frequency. Then switch to channel 12 and adjust A10 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8, adjust A8 for channel 8 oscillator frequency. Switch to channel 13 and adjust A9, then back to channel 8 and adjust A8 again.							
12.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point ⊕. Low side to chassis.	A31, A32, A33	If a separate signal generator is used, connect it loosely to antenna terminals. Adjust scope for maximum gain and adjust sweep generator output to provide usable pattern on scope. Adjust A31, A32 and A33 for response similar to Fig. 4. A31 affects frequency bandpass. A33 affects the response bandwidth. A33 affects tilt.
13.		Connect frequency meter as in step 10.	Not used	Set freq. meter to 257MC	13	Not used	A9	Set fine tuning control to its mid-range position. Adjust A9 for audible beat on frequency meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction, then adjust A8 to again obtain audible beat.
14.	Two 300Ω Carbon Resistors	Across antenna terminals with 300Ω in each lead.	213MC (30MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point ⊕. Low side to chassis.	A34, A35	Adjust for response similar to Fig. 4. Turn off generator and check oscillator injection voltage at point ⊕ (Step 13).
15.	Connect DC probe of VTVM to point ⊕. Common to chassis. Check oscillator injection voltage for proper limits (3 volts MINIMUM and 5.5 volts MAXIMUM). If not within limits replace the mixer-osc. tube (5U8/V3). Recheck oscillator injection voltage. If necessary replace C33 to obtain proper limits of oscillator injection voltage. If C32 or V3 were replaced, repeat steps 11, 12, and 13.							
16.		Connect frequency meter as in step 10.	Not used	Freq. meter to 189MC	6	Not used	A15	Set fine tuning control to its mid-range position. Adjust A15 for audible beat on frequency meter.
17.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω carbon resistors.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point ⊕. Low side to chassis.	A36, A37, A38	Adjust for response similar to Fig. 4 with video and sound markers above 90% on response curve. Adjust A38 for maximum amplitude between markers. A37 affects bandpass. A38 affects tilt (when A36 is properly adjusted). Recheck oscillator injection voltage at point ⊕ for proper limits using VTVM as in step 15.
18.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point ⊕. Low side to chassis.		Check for response similar to Fig. 4. Check oscillator injection voltage for each channel at point ⊕. If markers fall below 90% on any one channel retouch A36, A37 and A38 to obtain response curves within proper limits.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
19.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 4. Check oscillator injection voltage for each channel at point ⊕. If markers fall below 90% on any one channel retouch A31, A32 and A33 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	11			
			201MC (10MC Swp)	199.25MC 203.75MC	10			
			193MC (10MC Swp)	191.25MC 195.75MC	9			
			189MC (10MC Swp)	187.25MC 191.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
20.		Connect freq. meter as in step 10.	Not used	257MC	13	Not used	A9	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point ⊕. To verify that the voltage is within 2 volts MINIMUM and 5.5 volts maximum.
				255MC	12		A10	
				245MC	11		A11	
				239MC	10		A12	
				233MC	9		A13	
				227MC	8		A14	
				221MC	7		A15	
				129MC	6		A16	
				123MC	5		A17	
				113MC	4		A18	
				107MC	3		A18	
				101MC	2		A20	

FIG. 1

FIG. 2

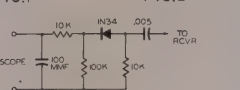

FIG. 3

FIG. 4

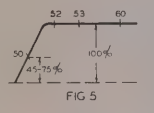

FIG. 5

FIG. 6

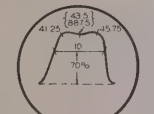

FIG. 7

FIG. 8

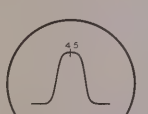

FIG. 9

FIG. 10

ANTENNA MATCHING UNIT ALIGNMENT FOR KRK32A, KRK33, KRK33A

The antenna matching unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. If a new unit is installed the RF unit should be re-aligned. Alignment should not be attempted without the proper alignment facilities. The FM trap (A39 adjustment) which is located on the antenna matching unit may be adjusted without seriously affecting the RF alignment.
Disconnect the lead from the FM trap (L7) to the channel switch. Use a short jumper and connect point ⊕ on the matching unit through a .001 MFD capacitor to pin 1 (grid) of 3CB6 (V3). Short pin 1 of 3CF6 (V3) to chassis. Cover of the matching unit must be in place during alignment. Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain. Connect the positive terminal to chassis and the potentiometer arm to the ungrounded side of C35. Set the potentiometer arm to obtain -5 volts at the point.
A30, A31, A32 and A33 are adjusted by expanding or compressing coil turns in the "KRK 32A Antenna Matching Unit."
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	Not used	45.75MC (400%Mod)	Any	Vert. Amp. to point ⊕. Low side to chassis.	A30	Set scope gain to maximum and adjust for MINIMUM 400% indication on scope.
22.	"	"	"	41.25MC (400%Mod)	"	"	A31	"
23.	"	"	50MC (30MC Swp)	50MC 53MC 55MC 60MC	"	Vert. Amp. thru detector probe (Fig. 3) to point ⊕. Low side to chassis.	A32, A33	Remove the .001MFD capacitor (see above instruction) from point ⊕ and connect a 300Ω, 1 watt carbon resistor from point ⊕ to chassis. Adjust A32 and A33 to obtain response similar to Fig. 5. Repeat steps 18, 20 and 21 until no further improvement is noted. Remove the 300Ω resistor and the detector probe between L7 and the channel switch. Remove short from pin 1 of V3.

VHF TUNER ALIGNMENT FOR KRK33, KRK33A

A tuner unit which is operative and requires only minor touch-up adjustments will require no pre-setting of adjustments. Where complete alignment is necessary make the following adjustments. Preset A8 all the way out. Set channel 7 to 13 oscillator slugs one turn from tight.
Adjust A7 so that the slug is all the way out.
Disconnect the link from terminal L35 on tuner and terminate the link with a 39Ω carbon resistor.
Tuner Alignment as outlined below requires the use of a heterodyne frequency meter.
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
24.		High side to point ⊕. Low side to chassis.	Not used	43.5MC (400% Mod)	2	Vert. Amp. to point ⊕. Low side to chassis.	A38	Short the tuner AGC to chassis. Adjust scope for maximum gain and generator for maximum output. Adjust for MINIMUM 400% indication on scope.
25.		RF input of heterodyne meter to end of insulated wire. (Inserted in hole provided for adjustment of A22)	"	Set freq. meter to 227MC	8	Not used	A39, A40, A8	Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust the potentiometer arm for -3.5 volts at tuner AGC. Preset A39 for -3 volts at point ⊕. (limits of oscillator injection voltage are 2 - 5.5 volts). Turn the fine tuning control maximum clockwise Adjust A40 for audible beat on frequency meter. Adjust A8 clockwise until beat note just begins to change, then turn one full turn in the same direction. Return fine tuning control to its mid-range position.
26.	If channel 8 oscillator frequency cannot be reached by adjustment of A40 switch to channel 13 and adjust A9 for channel 13 oscillator frequency, then switch to channel 12 and adjust A10 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator frequency on each channel. Also, on channel 8, adjust A40 for channel 8 frequency. Switch to channel 13 and readjust A9, then switch back to channel 8 and adjust A40 again.							
27.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point ⊕. Low side to chassis.	A31, A32, A33, A41	Adjust A6 maximum counter clockwise. If a separate marker generator is used, connect it loosely to antenna terminals. Adjust scope for maximum gain an attenuate sweep generator output for a MINIMUM signal input to produce a usable pattern on scope. Adjust A31, A32, A33 and A41 for response similar to Fig. 4. Adjust A41 for maximum amplitude between markers. A31 affects frequency bandpass. A32 affects the response bandwidth. A33 affects tilt.
28.	Connect the DC probe of VTVM to point ⊕. Adjust A39 for -3 volts at point ⊕. Readjust A8, A31, A32 and A33 for response similar to Fig. 4. Adjust A41 for maximum gain at mid-point of response curve. If necessary, repeat until desired responses is obtained.							
29.		Connect frequency meter as in step 25.	Not used	Freq. meter to 257MC	13	Not used	A9	Turn fine tuning control fully clockwise. Adjust A9 for audible beat on frequency meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction and then adjust A8 to again obtain an audible beat.
30.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (30MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point ⊕. Low side to chassis.	A34, A35	Adjust for response similar to Fig. 4. Turn off generator and check oscillator injection voltage at point ⊕ with VTVM. Voltage should be within limits (3 - 5.5 volts). If A39 required adjustment, turn sweep generator back on and recheck channel 13 response. If necessary, re-touch A34 and A35 to obtain desired response.
31.		Connect frequency meter as in step 25.	Not used	Freq. meter to 227MC	8	Vert. Amp. to point ⊕. Low side to chassis	A8	Check for audible beat on frequency meter. If necessary, readjust A8 for proper oscillator frequency.

RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

ALIGNMENT INSTRUCTIONS (cont)

VHF TUNER ALIGNMENT FOR KRK33, KRK33A (Con't)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
32.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point (B). Low side to chassis.	A21, A22, A23, A41	If necessary, retouch A21, A22, A23 and A41 for response similar to Fig. 4. If A23 required adjustment, turn off generator and switch back to channel 13 and check oscillator injection voltage at point (C) with VTVM. If the oscillator trimmer, A39, was far off, it may be necessary to repeat steps 31 and 32 several times before proper setting of A39 is obtained.
33.		Connect frequency meter as in step 25.	Not used	Freq. meter to 129MC	6	Not used	A16	Set fine tuning control its mid-range position. Adjust A16 for audible beat on frequency meter.
34.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point (B). Low side to chassis.	A26, A27, A28	Adjust for response similar to Fig. 4. Check oscillator injection voltage at point (C) with VTVM. If necessary, readjust A39. If A39 required adjustment, switch the receiver and generator to channel 8. Retouch A23 for response similar to Fig. 4. Recheck A8 and A40 for proper oscillator frequency as in step 25.
35.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for response similar to Fig. 4. If markers fall below 80% on any low band channel, retouch A26, A27 and A28 for best compromise. Check oscillator injection voltage on each low band channel at point (C) with VTVM. It should be within limits of 2 - 5.5 volts.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
36.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"	A21, A22, A23	Check for response similar to Fig. 4. If markers fall below 80% on any high band channel retouch A21, A22 and A23 for best compromise on all high band channels. Check oscillator injection voltage on all high band channels at point (C) with VTVM. It should be within limits of 2 - 5.5 volts.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
37.		Connect frequency meter as in step 25.	Not used	257MC	13	Not used	A9	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point (C). To verify that the voltage is within 2 volts MINIMUM and 5.5 volts MAXIMUM.
				251MC	12		A10	
				245MC	11		A11	
				239MC	10		A12	
				233MC	9		A13	
				227MC	8		A14	
				221MC	7		A15	
				129MC	6		A16	
				123MC	5		A17	
				113MC	4		A18	
				107MC	3		A19	
				101MC	2		A20	

UHF TUNER ALIGNMENT FOR KRK33, KRK33A

RF adjustment requires removal of the tuner shield therefore the UHF section must be removed from the tuner assembly for RF alignment. The tuner need not be removed for IF and oscillator adjustments. Connect a 100Ω carbon resistor from the center conductor of the IF cable to chassis (Point (H) on schematic).
If the oscilloscope does not have a sensitivity of 5 millivolts per inch, a suitable preamplifier may be used.
Fabricate a test dial with marks scribed on its circumference at 0, 5 and 164 degrees. The dial should be made to fit over the split gear on the tuner shaft for accurate alignment. Locate the 0 degree reference point with the capacitor plates fully meshed. The stop pin on the tuner should be against the stop plate on the gear assembly when the plates are fully meshed.
Connect the high side of the VHF marker signal generator thru a 1000Ω carbon resistor to point (I). Insert resistor lead (insulate lead) through operature provided for crystal removal. Connect low side to chassis. Couple UHF marker generator loosely to the UHF antenna terminals.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
38.	Two 130Ω Carbon Resistors	Across UHF antenna terminal with 130Ω in each lead.	887.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 887.5MC	83 (164°) on tuning dial)	Vert. Amp. (thru pre-amp. if needed) to point (B). Low side to chassis.	A42, A43, A44	Adjust A42 and A43 for maximum amplitude over coupled response curve centered at 887.5MC similar to Fig. 7. Adjust A44 until 43.5MC marker coincides with the 887.5MC marker. The 41.25MC and 45.75MC markers should be symmetrically located on top of response curve as in Fig. 7.
39.	"	"	473.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 473.5MC	14 (5° on tuning dial)	"	A45, A46	Adjust A45 until 43.5MC coincides with 473.5MC marker as in Fig. 8. If A45 has insufficient range, adjust A46 until markers coincide. (Adjust A46 by repositioning coil). Repeat steps 38 and 39 until proper response is obtained.

40. Tune thru entire UHF range and check tracking. If the 41.25MC and 45.75MC markers fall below 70% on any UHF channel, it will be necessary to bend the RF plates to correct the mistracking. The plates may be bent by using a knife blade with the shielded cover removed. Knife the plate while tuning lower in frequency so that tracking above the point of knifing will not be disturbed. A check of the section requiring knifing may be made by touching the plates with the knifing tool while noting the effect on the response curve, then knifing the proper section or both sections if required.
Connect the DC probe to point (H). Common to chassis. Tune thru entire UHF range at the same time noting the reading on the VTVM. Readings between 0.3 vna 0.5 volts should be obtained. If voltages outside this limit are obtained, it indicates low B+ voltage, low or high crystal impedance or an oscillator tube outside allowable limits. Connect the DC probe to point (J). Common to chassis. Readings between .5 and 2.5 volts should be obtained. Readings outside this range will cause crystal currents beyond allowable limits and in such cases the oscillator tube should be replaced. If the oscillator tube is replaced steps 38 and 39 should be repeated.

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ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
41.	.0015MFD	High side to pin 8 (grid) of 5AN8 (V6A). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point Ⓔ. Common to chassis.	A47, A48, A49	Adjust for maximum deflection. Attenuate generator output for 5 volts at VTVM for final adjustments. Peak A47 and A49 with core at chassis end of coil. Correct peak of A48 should occur with core farthest away from chassis end of coil .
42.	"	"	"	"	DC probe to point Ⓕ Common to chassis.	A49	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
41.	.0015MFD	High side to pin 8 (grid) of 5AN8 (V6A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point Ⓔ. Low side to chassis.	A47, A48	Disconnect stabilizing capacitor, C63. Adjust for curve of maximum amplitude and symmetry similar to Fig. 9.
42.	"	"	"	"	"	Vert. Amp. to point Ⓕ. Low side to chassis.	A49	Reconnect stabilizing capacitor, C63. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 10. SLIGHTLY retouch A48 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Short pin 1 (grid) of 3CB6 (V5).

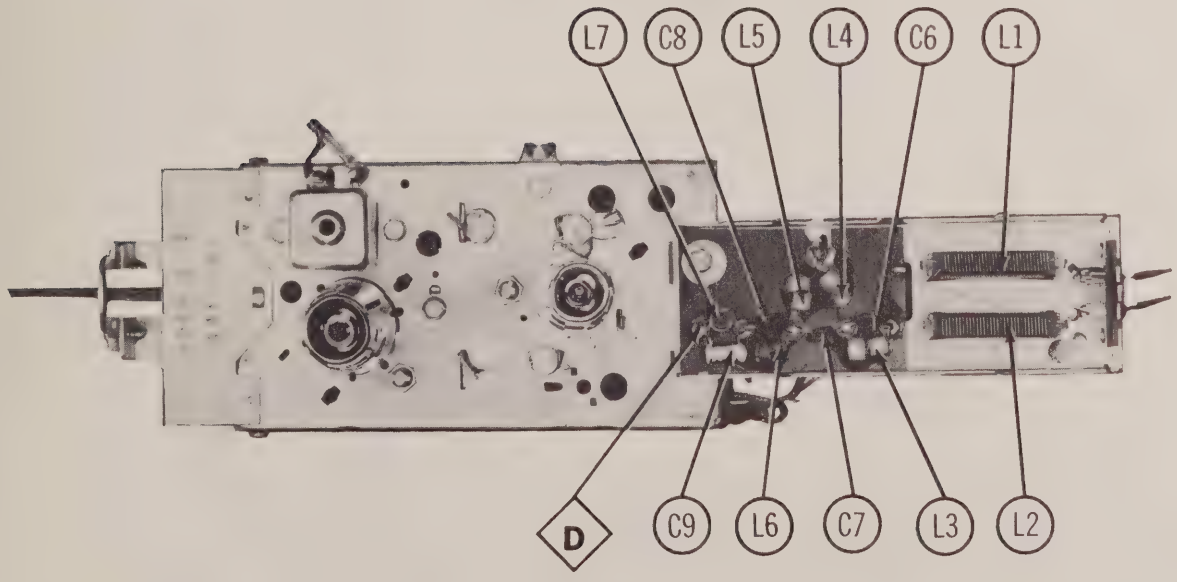
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
43.	.0015MFD	High side to pin 8 (grid) of 5AN8 (V6A). Low side to chassis.	Not used	4.5MC (400∿Mod)	Any non-interfering channel	Vert. Amp. thru detector (Fig. 3) to pin 9 (plate) of 6S4A (V7). Low side to chassis.	A50	Adjust generator output for approximately 0.5 volt output. Adjust A50 for MINIMUM 400∿ indication on scope. Correct adjust of A50 should occur with core at chassis end of coil. Remove short from pin 1 of V5.

ALTERNATE 4.5MC TRAP ALIGNMENT

Restore set to normal operating condition and tune in a TV station. Inspect the picture for evidence of 4.5MC beat interference. If a 4.5MC beat is noted turn fine tuning control slightly clockwise to emphasize the 4.5MC beat interference, then adjust A50 to minimize the 4.5 MC beat.

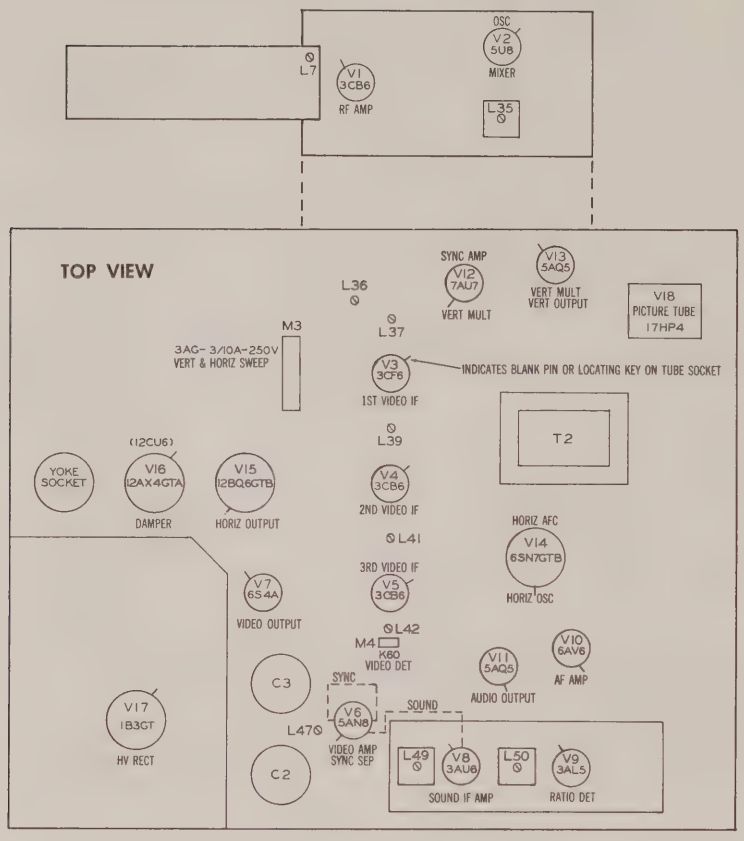
FM TRAP ADJUSTMENT

Tune in a local TV station in which FM interference is noticed and adjust A29 for MINIMUM interference in the picture. Use care when adjusting A29 since the trap may be adjusted to attenuate stations on channel 5 or 6. If these channels are received check to see that adjustment A29 does not affect sensitivity of these channels.



RF TUNER TOP VIEW

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

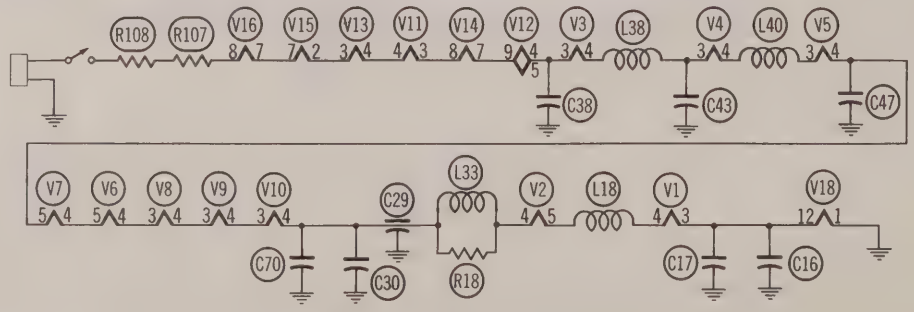
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V18**
Has pic, no sound - **V8, V9, V10, V11**

SYNC FAILURE
No vert. sync - **V12, V13**
No horiz. sync - **V12, V14**
No vert. or horiz. sync - **V6, V12**

SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V18, Fuse (M3)**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, M1, M2**
Vert. off freq. - **V12, V13**
Horiz. off freq. - **V12, V14**

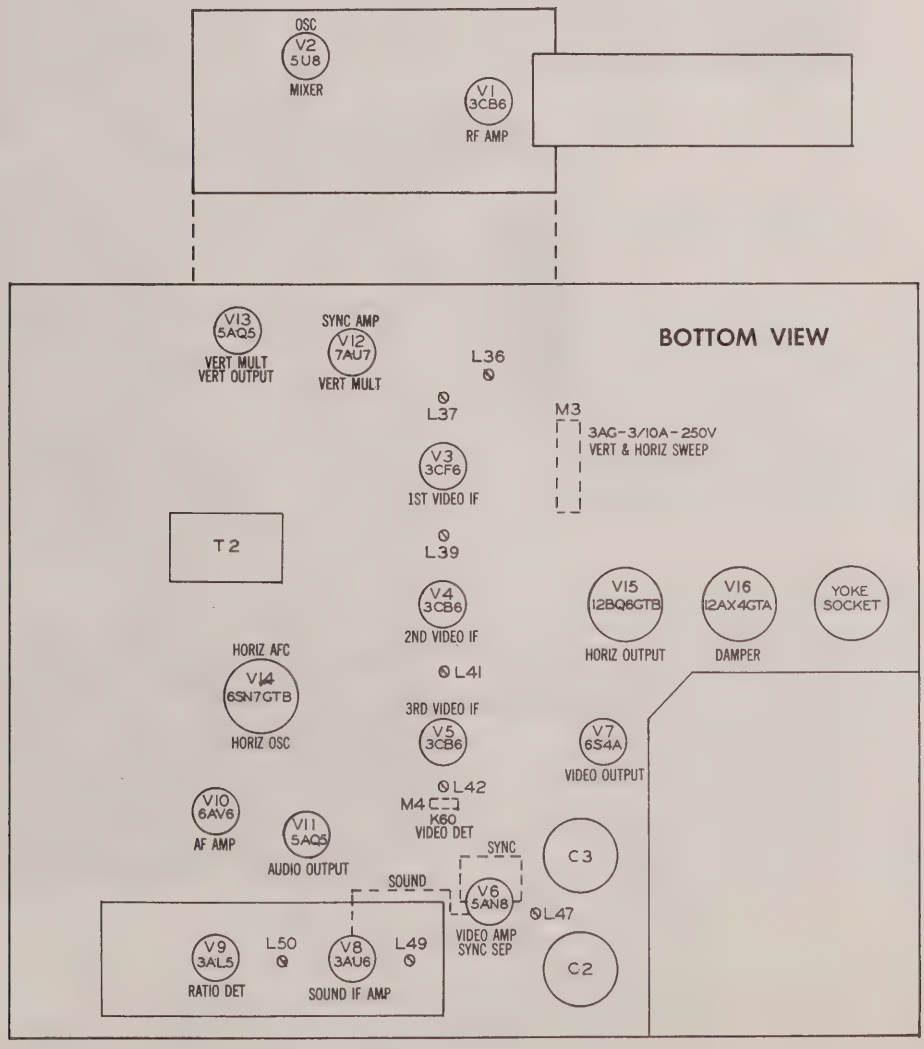
NOTE: Since this receiver employs tubes used in series filament network, an open filament in any tube in series may cause the set to be inoperative (See circuit below).



RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	3CB6	750KΩ	47Ω	1Ω	2Ω	†1. 5KΩ	†30KΩ	0Ω		
V 2	5U8	†6KΩ	100KΩ	Inf.	3Ω	2Ω	Inf.	0Ω	Inf.	Inf.
V 3	3CF6	750KΩ	68Ω	11Ω	10Ω	▲680Ω	▲680Ω	0Ω		
V 4	3CB6	80KΩ	▲18Ω	10Ω	9Ω	†750Ω	†750Ω	Inf.		
V 5	3CB6	1. 1Ω	180Ω	9Ω	8Ω	†3. 5KΩ	†3. 5KΩ	0Ω		
V 6	5AN8	†1. 5Meg	3Meg	0Ω	6Ω	7Ω	†11. 5KΩ	†56KΩ	1Meg	250Ω
V 7	6S4A	NC	1. 3KΩ	470KΩ	7Ω	8Ω	470KΩ	NC	NC	†6. 8KΩ
V 8	3AU6	47KΩ	0Ω	6Ω	5Ω	†4KΩ	†4KΩ	120Ω		
V 9	3AL5	Inf.	Inf.	5Ω	4Ω	10KΩ	0Ω	10KΩ		
V 10	3AV6	10Meg	0Ω	4Ω	3Ω	0Ω	0Ω	†330KΩ		
V 11	5AQ5	470KΩ	470Ω	14Ω	15Ω	†2. 2KΩ	†1. 8KΩ	470KΩ		
V 12	7AU7	†17KΩ	33KΩ	0Ω	11Ω	11Ω	▲1. 4Meg	1. 6Meg	0Ω	12Ω
V 13	5AQ5	1. 5Meg	0Ω	16Ω	15Ω	†550Ω	†42Ω	1. 5Meg		
V 14	6SN7GTB	1. 2Meg	†39Ω	180KΩ	250KΩ	†39KΩ	0Ω	12Ω	14Ω	
V 15	12BQ6GTB	NC	16Ω	TP	†10KΩ	1Meg	TP	19Ω	100Ω	TOP CAP ▲19Ω
V 16	12AX4GTA	NC	NC	1Meg	NC	†42Ω	NC	19Ω	21Ω	
V 17	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲355Ω
V 18	17HP4	0Ω	470KΩ	PIN 6 †4KΩ	PIN 10 ▲330KΩ	PIN 11 †210KΩ	1Ω			

†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 7 OF V4.
▲MEASURED FROM PIN 3 OF V16.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART

SET 294 FOLDER 10

RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

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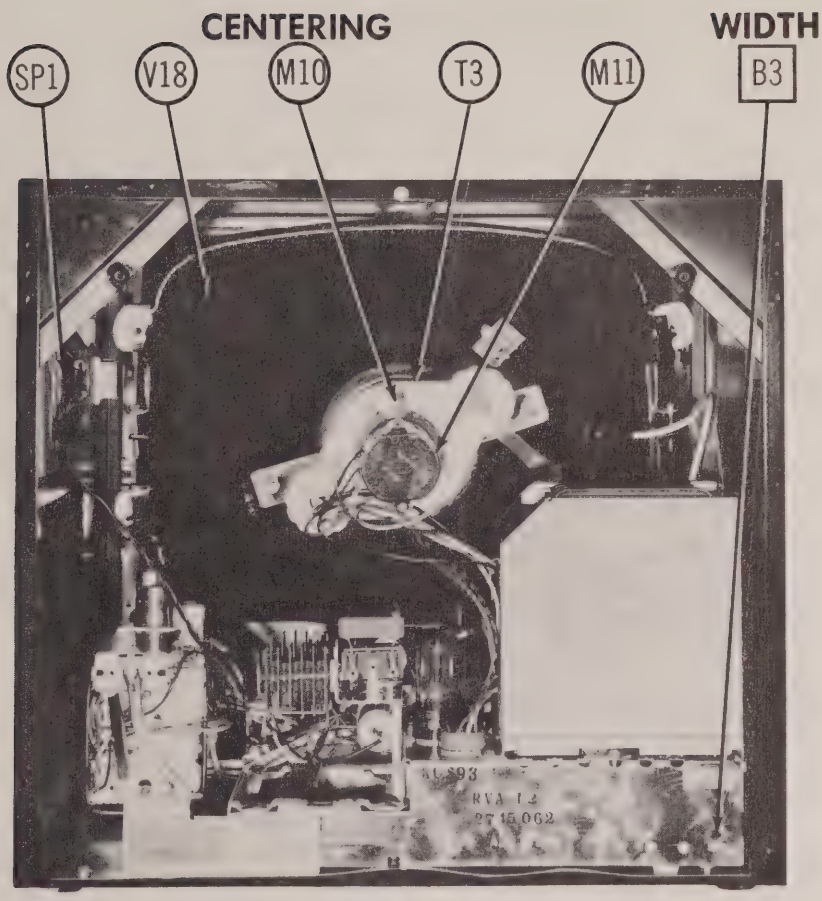
RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R,
RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

CHECK OF HORIZONTAL FREQUENCY ADJUSTMENT

1. Turn the horizontal frequency adjustment fully clockwise. Approximately 12 diagonal bars should be sloping downward to the left. Turn the horizontal frequency adjustment slowly counter clockwise until $1\frac{1}{2}$ to 3 diagonal bars are present on the screen. The picture should pull into sync upon slight additional rotation of the horizontal frequency adjustment and remain in sync for approximately an additional two turns in a counter clockwise direction. Further counter clockwise rotation should cause picture to lose sync with 2 to 5 diagonal bars present before motor boating sets in. Interrupted oscillation (motorboating) should occur before maximum counter clockwise rotation of the horizontal frequency adjustment is reached.
2. If the receiver does not pass the above check, turn the horizontal drive trimmer (B2) maximum clockwise, then one full turn in a counter clockwise direction. Adjust the width coil slug (B3) so that the stud is flush with the inside of the chassis. Adjust the horizontal phase slug (B1) until 3 or 4 diagonal bars are present before motorboating occurs, when the horizontal frequency adjustment is turned counter clockwise from the point at which the picture loses sync.
3. If the picture still will not sync properly, it will be necessary to perform the adjustments outlined under "Horizontal Frequency And Waveform Alignment".

HORIZONTAL FREQUENCY AND WAVEFORM ALIGNMENT

Turn B2 fully clockwise, then counter clockwise one full turn. Adjust B3 so that the stud is flush with the inside of the chassis. Connect a short jumper across the phase coil(L52)and turn the horizontal frequency adjustment until the picture fall into sync. Remove jumper from L52.

Connect the vertical amplifier of an oscilloscope to the junction of L51, L52 and R93. Turn the horizontal frequency adjustment clockwise until the picture loses sync, then counter clockwise until the picture just falls into sync. Adjust the phase slug (B1) for response on scope similar to Fig. 11 with broad and narrow peaks of equal amplitude. If necessary, keep the picture in sync with the horizontal frequency adjustment. Remove the oscilloscope.

Turn the horizontal frequency adjustment until the picture loses sync, with diagonal bars sloping to the left. Slowly turn the horizontal frequency adjustment in a counter clockwise direction and note the number of diagonal bars present just before the picture pulls into sync. One and a half to three bars should be present. Leave horizontal frequency adjustment set at the pull-in point and adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of a vertical white line near the center of the picture.

Turn the brightness control fully clockwise and adjust B3 for a picture slightly wider than necessary to fill the picture mask horizontally.

Readjust brightness control for normal brightness and readjust B2 as above.

The sync action should now be as outlined in paragraphs 1 and 2 under "Check of Horizontal Frequency Adjustment".

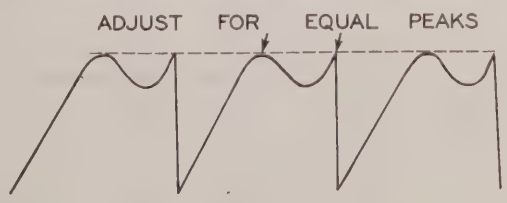


FIG. 11

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V15 and V16. Check M1 and M2. Check adjustments B2 and B3. Check C1, C103, R98, R108 and other associated components.

DRIVE LINES

Check by substitution V15 and V16. Check adjustment B2. Check T1, T3A, R98, C103 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines."

PIE CRUST EFFECT

Check by substitution V14, V15 and V16. Check C98, C96 for open. Check L51, R92 and other associated components.

XMAS TREE EFFECT

Check by substitution V14, V15 and V16. Check T1 and T3 for internal arcing. Check L51, L52, C95, C99, R85, R92 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T2, T3B, C90 and other associated components.	Check R2, R75, R79, C87, C88, C86, C89, C82 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check R75, T2 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R2, R75, C86, C82 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check R4, R79, C86, T2 and other associated components.

FOLDS

Check by substitution V12 and V13. Check C82, C88, C89, T2, T3B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V12. Check C74, C75, C76, C77, R64, R68, R65 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check vertical integrator network. Check C81, C82, R5 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V14. Check C93, C94, C96, C97, C98, L51 and other associated components.

HORIZONTAL BENDING

Check by substitution V6, V12 and V14. Check components associated with V14.

VIDEO

LOSS OF VIDEO

Check by substitution V6 and V7. Check C51, C53, C56, C58, R39, R43, R48, R45 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A50. Check video IF alignment.

POOR CONTRAST

Check by substitution V6 and V7. Check contrast control. Check L46, L48, C51, C53, C56, C58, C52, R40 and other associated components.

NEGATIVE PICTURE

Check by substitution V6 and V7. Check picture tube. Check C51, C53, C56, C58, R39, R42, R40, L46, L48 and other associated components.

SMEAR

Check by substitution V6 and V7. Check L43, L44, L46, L48, C51, C56, C58 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C66, C69, C71, C72, C73, C3C, R57, R59, R60, T5, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A49 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound."

POWER

DEAD SET

If filaments fail to light, check all tubes. These tubes are connected in series. Check AC interlock assembly. Check switch on volume control. If filaments light, check M1, M2, C1 and R108. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1, M2, C1 and R108. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	3CB6	3CB6	7CM	
V2	Mixer-Osc.	5U8	5U8	9AE	
V3	1st Video IF Amp.	3CF6	3CF6	7CM	
V4	2nd Video IF Amp.	3CB6	3CB6	7CM	
V5	3rd Video IF Amp.	3CB6	3CB6	7CM	
V6	Video Amp. - Sync Sep.	5AN8	5AN8	9DA	
V7	Video Output	6S4A	6S4A	9AC	
V8	Sound IF Amp.	3AU6	3AU6	7BK	
V9	Ratio Det.	3AL5	3AL5	6BT	
V10	AF Amp.	3AV6	3AV6	7BT	
V11	Audio Output	5AQ5	5AQ5	7BZ	
V12	Sync Amp. - Vert. Mult.	7AU7	7AU7	9A	
V13	Vert. Mult. - Vert. Output	5AQ5	5AQ5	7BZ	
V14	Horiz. AFC-Horiz. Osc.	6SN7GTB	6SN7GTB	8BD	
V15	Horiz. Output	12BQ6GTB	12BQ6GTB	6AM	Use 12CU6 as alternate.
V16	Damper	12AX4GTA	12AX4GTA	4CG	
V17	HV Rect.	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	RCA Victor PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V18	17HP4/17RP4	17HP4/17RP4	17RP4/17HP4	17HP4/ 17RP4	17HP4/17RP4	12L	① Aluminized
		17HP4B ①		17HP4B ②		12L	② Silver Screen
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ②	21YP4A ①	12L	
		21YP4	21YP4	21YP4	21YP4	12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RCA Victor PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	150	200	100045	WS-427	TD-150-300	S-160	
C2	150	350	100043	FP227.6	TM-150-450	D-175	
C3A	▲100	350	100044	FP420.23	TM-3062	T-537	
B	▲10	350			TD-100-450	MT-4520	
C	20	50					
D	■20	350					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C4	1000	1000	100124	DD-102	1R5KV-102	DC3021	
C5	1000	1000	100124	DD-102	1R5KV-102	DC3021	
C6	18			D6-180	831-180	UC-5418	
C7	5			DD-050	831-050	ZT-555	
C8	27			D6-270	831-270	UC-5427	
C9	33			TCZ-33	NP0K-330	ZT-5433	
C10	3.3			TCZ-3R3	NP0A-3R3	ZT-5533	
C11	270		77838	D6-271	GP2K-271	UC-5327	
C12	1000		77084	MFT-1000			
C13	1-4		76532	829-4	3115-01-10	CT551	
C14	1000		77252	DD-102	801-001	DC-521	
C15	18		54207	TCZ-18	NP0K-180		
C16	1000		77252	DD-102	801-001	DC-521	
C17	470		77293	DD-471	831-471	UC-5347	
C18	270		77838	D6-271	GP2K-271	UC-5327	
C19	270		77838	D6-271	GP2K-271	UC-5327	
C20	390		75641	D6-391	GP2K-391	UC-5339	
C21	1-4		76532	829-4	3115-01-10	CT551	
C22	1.5		71500	TCZ-1R5	NP0A-1R5	ZT-5515	
C23	10		77865	TCZ-10	NP0A-100	ZT-541	
C24	1000		77084	MFT-1000			
C25	12		79710	TCN-12	N750K-120		
C26	82		78603	D6-820	801-820		
C27	100		79735	D6-101	801-101	UC-531	
C28	1000		77084	MFT-1000			
C29	1000		77084	MFT-1000			
C30	470		77293	DD-471	831-471	UC-5347	
C31	1000		73960	DD-103	811-01	DC-511	
C32	470		77293	DD-471	831-471	UC-5347	
C33	15		39044	TCN-15	N750K-150		
C34	470		77293	DD-471	831-471	UC-5347	
C35	.47	200	73787			PT4047	
C36	10000		73960	DD-103	811-01	DC-511	
C37	470		78622	DD-471	831-471	UC-5347	
C38	1000		77252	DD-102	801-001	DC-521	
C39	470		77293	DD-471	831-471	UC-5347	
C40	.39	200	79318				
C41	1000		77252	DD-102	801-001	DC-521	Note 1
C42	1000		77252	DD-102	801-001	DC-521	
C43	1000		78623	DD-102	801-001	DC-521	
C44	470		77293	DD-471	831-471	UC-5347	Note 2
C45	1000		78623	DD-102	801-001	DC-521	
C46	1000		77252	DD-102	801-001	DC-521	
C47	1000		77252	DD-102	801-001	DC-521	
C48	470		77293	DD-471	831-471	UC-5347	Note 2
C49	10			TCZ-10	NP0A-100	ZT-541	Note 3
C50	10		33098	D6-100	GP1K-100	UC-541	
C51	.1	200	73784	DF-104		PT401	
C52	.47	200				PT4047	
C53	120		71614	TCN-120	N750L-121		

PROPERTY OF
RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R,
RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KCS93, A, B, C)

SET 294 FOLDER 10

L. I. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C54	47		39042	TCN-47	N750K-470	NT-5447	
C55	6		77364				
C56	1	600	79149	DF-104		PT601	
C57	270			DS-271	GPSK-271	UC-5327	Note 4
C58	.1	600	73557	DF-104		PT601	
C59	3		78507	TCZ-3R3	NPOA-030	ZT-5533	
C60	39		79313		N330L-390		
C61	56		78324	TCN-56	N750K-560		
C62	10000		73980	DD-103	811-01	DC-511	
C63	.47	300	79048			PT4047	
C64	1000	500	53390	DD-102	501-001	MC355	
C65	.0033	600	73586	DS-332	GPS-333-332	PT6332	
C66	.0047	400	78017	DS-472	GPS-333-472	PT6347	
C67	4700	1000	100125	DD-472	BR5KV-472	PT6347	
C68	.033	500	73583	DF-303		PT6133	
C69	.01	300	79014	DS-103	GPS-333-103	PT411	
C70	1000		77359	DD-102	501-001	DC-521	
C71	.001	600	73543	DS-102	GPS1-102	PT521	
C72	.0027	600	73589	DS-272	GPS-333-272	UC-5327	
C73	.0027	1000	79030	DD-302		PT1623	
C74	.1	400	73551	DF-104		PT401	
C75	330		100123	DS-331	GPSK-331	UC-5333	
C76	330		100123	DS-331	GPSK-331	UC-5333	
C77	.033	600	73553	DF-303		PT6133	
C78	1000		77353	DD-102	501-001	DC-531	Note 2
C79	.0062	400	79018				
C80	.0027	600	73589	DS-272	GPS-333-272	UC-5327	
C81	.0039	600	78321			MC643	
C82	.01	600	73594	DS-103	GPS-333-103	PT611	
C83	.1	400	73551	DF-104		PT401	
C84	.068	600	79543				
C85	.068	300	79015				
C86	.033	600	73799	DF-303	817-03	PT6133	
C87	.0027	600	73589				
C88	.1	400	73577				
C89	.022	600	73798				
C90	.001	1600	73549	DD30-102	3KV-103	PT1521	
C91	.033	600	73798	DF-303	817-03	PT6133	
C92	.1	400	73561	DF-104		PT401	
C93	220	500	96518	DS-221	811-321	MC5340	
C94	82	1000	78473				
C95	68	1000	78475				
C96	.047	300	72787			PT4047	
C97	.022	400	73563	DF-303	817-03	PT4122	
C98	.1	400	73551	DF-104		PT401	
C99	330	1000	78474				
C100	.01	600	73594				
C101	.1	400	73551	DF-104		PT401	
C102	.0012	600	76995				
C103	680	1000	78796	DD-681	1R5KV-681	MC6368	
C104	100	600	73557	DF-104		PT601	
C105	27	300	73788				
C106	370	1000	79032	DD-371		MC6327	
C107	.047	1000	72597			PT615	
C108	56		79830	DD-561	3KV-560	DC30458	
C109	68			DD30-680	3KV-680	DC30468	
C110	.01	600	73594	DS-103	GPS-333-103	PT611	
C111	.22	300	78905			PT4022	Note 5

Note 1. Some versions use 470MMF in this application (part #78522).
Note 2. Not used in some versions.
Note 3. Some versions use 7MMF in this application (part #78909).
Note 4. Some versions use 220MMF in this application (part #78520).
Note 5. Used only in chassis KC893A and KC893C.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3000Ω		79099	QJ-779†	RTV-501	F1-18	UF33R	Contrast
B	1MEg					R1-57	URH6-7354	Volume, Tapped at 200KΩ.
C	Switch					S3-1	U3-35	Attach to R1B.
R2A	3.5Meg		100039	QU-140	A47-4Meg-S	AB-68	TAP356L	Height
B	Shaft		Not Req.	TQ	RN-3	AK-19	Not Req.	Attach to R2A.
R3A	200KΩ		100038	QU-125	A47-200K-S	AB-46		Brightness see note L
B	Shaft		Not Req.	TQ	RN-3	AK-19		Attach to R3A.
R3	200KΩ		100149	QU-129				Brightness See Note 2.
R4A	2.5Meg		100040	QU-239	A47-2.5Meg-S	AB-53	#U-585	Vertical Linearity
B	Shaft		Not Req.	TQ	RN-3	AK-19	Not Req.	Attach to R4A.
R5A	1.5Meg		100059	QU-138	A47-1.5Meg-S	AB-743		Vertical Hold See Note L
B	Shaft		Not Req.	TQ	RN-3	AK-19		Attach to R5A.
R5	1.5Meg		100041	QU-138				Vertical Hold See Note 2.
R6	7.5Meg							AGC See Note 3.

Note L. Used in chassis KC893.
Note 2. Used in chassis KC893B, KC893A, and KC893C.
Note 3. Used in chassis KC893A, and KC893C.
* Universal replacement (Mallory exact duplicate Part No. UE41J5). Use with Mallory 203 and 212 insulating washer.
† CONCENTRIKIT EQUIVALENT, K-4 KIT, BASE ELEMENTS AND SHAFTS, B17-123, P6-202 (Panel)
B13-137A, R1-220 (Rear)
76-1 (Switch)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	RCA Victor PART No.	IRC PART No.	NOTES
R7	100KΩ	½	502310	BTS-100K	
R8	100KΩ	½	502310	BTS-100K	
R9	22KΩ	½	502322	BTS-22K	
R10	47Ω	½	502047	BTS-47	
R11	47KΩ	½	512347	BTA-47K	
R12	56KΩ	½	502256	BTS-56K	
R13	100Ω	½	502210	BTS-1000	
R14	47Ω	½	502147	BTS-470	
R15	680Ω	½	502460	BTS-680	
R16	100KΩ	½	502400	BTS-100K	
R17	2700Ω	½	502327	BTS-2700	
R18	120Ω	½	502112	BTS-120	
R19	100KΩ	½	502410	BTS-100K	
R20	5600Ω	½	502256	BTS-5600	
R21	1000Ω	½	502210	BTS-1000	
R22	1000Ω	½	502210	BTS-1000	
R23	15KΩ	½	503315		
R24	62KΩ	½			Note 1
R25	680Ω	½	502168	BTS-680	
R26	68Ω	½	502068	BTS-68	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	RCA Victor PART No.	IRC PART No.	NOTES
R27	150KΩ	½	502415		
R28	150KΩ	½	502415		
R29	680Ω	½	502168	BTS-680	
R30	180Ω	½	502018	BTS-18	
R31	470Ω	½	502147	BTS-470	
R32	180Ω	½	502118	BTS-180	
R33	3900Ω 5%	½	502392		
R34	68KΩ	½	502368	BTS-68K	
R35	680KΩ	½	502468	BTS-680K	
R36	100KΩ	½	502310	BTS-1000	Note 2
R37	1MEg	½	502510	BTS-1Meg	
R38	33KΩ	½	502333	BTS-33K	
R39	18KΩ	½	502318	BTS-18K	
R40	4700Ω	½	502547	BTS-4700	
R41	3300Ω	½	502533	BTS-3300	
R42	56KΩ	½	513356	BTA-56K	
R43	2200Ω	½	502223	BTS-2200	
R44	2900Ω	½	502329		
R45	470KΩ	½	502447	BTS-470K	
R46	68000Ω	½	513368	BTA-8800	
R47	470KΩ	½	502447	BTS-470K	
R48	820Ω	½	502182	BTS-820	
R49	470Ω	½	502147	BTS-470	
R50	47KΩ	½		BTS-47K	
R51	10000Ω	½		BTS-1000	
R52	120Ω	½		BTS-130	
R53	33KΩ	½		BTS-33K	
R54	10KΩ	½		BTS-10K	
R55	10KΩ	½		BTS-10K	
R56	27KΩ	1	502327		
R57	10Meg	½	503610	BTS-10Meg	
R58	330KΩ	½	502433	BTS-330K	
R59	470KΩ	½	502447	BTS-470K	
R60	470Ω	½	512147	BTA-470	
R61	1800Ω	½	502218	BTS-1800	
R62	270KΩ	½	502427	BTS-270K	
R63	1.5Meg	½	502515	BTS-1.5Meg	
R64	1.5MEg	½	502515	BTS-1.5Meg	
R65	1.5Meg	½	502515	BTS-1.5Meg	
R66	3900Ω 5%	½	502339	BTS-3900 5%	
R67	560KΩ	½	503468	BTS-560K	
R68	33KΩ	½	503333	BTS-33K	
R69	10KΩ	1	502310	BTA-10K	

ITEM No.	RATING OHMS	RATING WATT	RCA Victor PART No.	IRC PART No.	NOTES
R70	22KΩ	½	503322	BTS-22K	
R71	18KΩ	½	503318		
R72	1000Ω	½	503310	BTS-1000	
R73	220KΩ	½	502433	BTS-330K	
R74	150KΩ	½	502415	BTS-150K	
R75	470KΩ	½	502447		
R76	15KΩ 5%	½	502315		
R77	180KΩ	½	502418		
R78	330KΩ	½	502333	BTS-6300	
R79	620KΩ 5%	½	502462	BTS-620K 5%	
R80	330KΩ	½	502433	BTS-330K	
R81	470KΩ	½	502447		
R82	22KΩ 5%	½	502223		
R83	33KΩ 5%	½	502333		
R84	22KΩ	½	502322		
R85	180KΩ	½	502418		
R86	330KΩ	½	502433	BTS-330K	
R87	820KΩ	½	503482	BTS-820K	
R88	100KΩ 5%	½	502410	BTS-100K 5%	
R89	82KΩ 5%	½	502382	BTS-82K 5%	
R90	3900Ω	½	502339	BTS-3900	
R91	150KΩ 5%	1	512415	BTA-150K 5%	
R92	6.8Meg	½	502568	BTS-6.8Meg	
R93	47KΩ	½	503347	BTS-47K	
R94	270KΩ	½	503427		
R95	820KΩ	½	503482		
R96	39KΩ	1	512339	BTA-39K	
R97	1Meg	½	503510		
R98	47Ω	½	503047		
R99	10KΩ	2	523310		
R100	100Ω	2	74016		
R101	680Ω	1			
R102	560Ω	1			
R103	1000Ω	1			
R104	68KΩ	½	503368	BTS-68K	
R105	3000Ω	1	100131	PWT-3000	
R106	100Ω	½	502310	BTS-1000	
R107	3Ω	20	100122		
R108	450Ω Cold 9.5Ω Hot		100118		
R109	5.6Ω	8	100117		
R110	470KΩ	½	502310	BTS-470K	
R111	1.5Meg	½		BTS-1.5Meg	Note 3

Note L. Not used in some versions.
Note 2. Chassis KC893A and KC893C may use a 560KΩ ½W resistor Mfgr. part #503456 in this application.
Note 3. Used in chassis KC893A and KC893C.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Horiz. Output Trans.	79736	FB41 ⑦	HVO-9 * ①		X060 ⑦	A-8233 ⑦ ①	FLY-34 * ①	D-19 * ①
T2	Vert. Output Trans.	79143					A-8145 ⑦ ⑥		
T3A	Yoke-Horiz.(13MH)	79868 ⑦	DF60S ④	MDF-72		T70Y14/43	DY-8A ⑦ ⑥	Y-7 ⑦ ⑥	Y-17-1 ⑦ ⑥
B	Vert.(26.5MH)		⑤	⑤ ⑦		⑤ ⑦			
T4	Width Coil (2.7-17MH)	79144	RF600 ⑦	MWC-11		20R16	WC-8	WC-18 ⑦	WC-12 ⑦

① Drill new mounting hole(s).
② Includes capacitor C108 and resistors R101, R103 and R113.
③ Connect as auto transformer.
④ Use original mounting bracket.
⑤ Connect horizontal damping network across terminals #3 and #7, use original damping network, if necessary.
⑥ Remove damping capacitor from terminals #1 and #3, use original horizontal damping network, if necessary.
⑦ Connect to terminals #1 and #3.
⑧ Enlarge mounting hole.
⑨ Connect to coded red and blue terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	9	9		9	7	9	9
	4	8	8		7 & 8	6	8	7 & 8
	3	5	5		5	5	5	5
	2	3	3		3	4	3	3
	1	1	1		1	3	1	1
Convert Width Coil Across	2 & 1	3 & 1	3 & 1		3 & 1	3 & 4	3 & 1	3 & 1
Special Notes →								

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC.	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	7.6KΩ	3.5Ω	100037	Z1003	A-3020	A-3278 ①	26R48	S-9Z	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP	RCA Victor PART No.	QUAM PART No	NOTES
SP1	4"	PM	3.5Ω	79596	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	RCA Victor PART No.	ARESSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Trans.	.8Ω	.8Ω					Note 1
L2	Ant. Matching Trans.	.8Ω	.8Ω					Note 1
L3	IF Trap	0Ω						Note 1
L4	Ant. Shunt Coil	0Ω						Note 1
L5	Ant. Shunt Coil	0Ω						Note 1
L6	IF Trap	0Ω						Note 1
L7	FM Trap	0Ω						Note 1
L8	Ant. Coil	0Ω		77859				Channel 3, Note 2
L9	Ant. Coil	0Ω		79738				Channel 4, Note 2
L10	Ant. Coil	0Ω		79719				Channel 5, Note 2
L11	Ant. Coil	0Ω		79714				Channel 6, Note 2
L12	Ant. Coil	0Ω		73461				Channel 8, Note 2
L13	Ant. Coil	0Ω		79737				Channel 9, Note 2
L14	Ant. Coil	0Ω		71689				Channel 10, Note 2
L15	Ant. Coil	0Ω		79713				Channel 11, Note 2
L16	Ant. Coil	0Ω		71472				Channel 12, Note 2
L17	Ant. Coil	0Ω		79710				
L18	FIL Choke	0Ω		73477				
L19	RF Coil	0Ω		79731				Channel 3, Note 3
L20	RF Coil	0Ω		79737				Channel 3, Note 3
L21	RF Coil	0Ω		79717				Channel 4, Note 3
L22	RF Coil	0Ω						Note 3
L23	RF Coil	0Ω		73460				Channel 6, Note 3
L24	RF Coils	0Ω						Channel 7 thru 11, Note 3
L25	RF Coil	0Ω		79721				Channel 13, Note 3
L26	Mixer Grid Coil	0Ω		79737				Channel 2, Note 4
L27	Mixer Grid Coil	0Ω		79715				Channel 3, Note 4
L28	Mixer Grid Coil	0Ω		71469				Channel 4, Note 4
L29	Mixer Grid Coil	0Ω		79739				Channel 5, Note 4
L30	Mixer Grid Coil	0Ω						Channel 6, Note 4
L31	Mixer Grid Coils	0Ω						Channel 7 thru 12, Note 4
L32	Mixer Grid Coil	0Ω		73461				Channel 13, Note 4
L33	FIL Choke	0Ω		79730				
L34	Osc. Coils	0Ω		79722				Includes stator complete with rotor & coils. Includes 27KΩ resistor.
L35	Conv. Plate	.2Ω	.6Ω	79734		TV-153	6320*	
L36	4'I. 26MC Trap	.1Ω		78304		TV-120	6310	
L37	1st Video IF	0Ω	.3Ω	78303	17-4523			Note 8
L38	FIL Choke	0Ω						Note 8
L39	2nd Video IF	.1Ω	1.1Ω					Note 8
L40	FIL Choke	0Ω						Note 8
L41	3rd Video IF	1Ω	1.1Ω					
L42	4th Video IF	1Ω	1.1Ω					
L43	Series Peaking Coil	2.7Ω		78011	19-3036	TV-180	6178	36 Microhenries
L44	Shunt Peaking Coil	7.3Ω		71536	19-3280	TV-125	6181	250 Microhenries
L45	Series Peaking Coil	5.5Ω		74214	19-3180	TV-124	6180	180 Microhenries, Note 5
L46	Shunt Peaking Coil	4.8Ω		100131	19-3125-m		6182-m	130 Microhenries, Wound on 6.8KΩ resistor, Note 6
L47	4.5MC Trap	8Ω		78157	17-3402-a		1470	
L48	Series Peaking Coil	7Ω		71538	19-4180	TV-123	6179	180 Microhenries, Wound on 39KΩ resistor, Note 7
L49	Sound IF	2.3Ω		78160	16-3445*	TV-113*	6303*	Tertiary Winding- 3Ω
L50	Ratio Det.	11Ω	.76Ω†	78161	17-3487*	TV-114*	6305*	
L51	Horiz. Osc.	23Ω	58Ω	79534	20-4402†	TV-163†	6312	
L52	Horiz. Phase	47Ω		79184	20-4403†	TV-162†	6314	
L53	RF Choke	.72Ω		79640	18-1001		4804	1.5 Microhenries, IRC Part No. CL-1

Note L. Complete antenna matching trans. Part No. 79733. Includes C6, C7, C8, C9, L1 thru L7.
Note 2. Stator complete with rotor, caps., & coils C1, L9 thru L17.
Note 3. Stator complete with rotor, caps., coils, & resistors. R15, C18, L19 thru L25.
Note 4. Stator complete with rotor, caps., coils, & resistors. R14, R15, R16, C19, C20, C22, L26 thru L32.
Note 5. 180 microhenries series peaking coil may be wound on 22KΩ resistor in this application.
Note 6. 130 microhenries shunt peaking coil may be wound on 2.2KΩ resistor in this application.
Note 7. 180 microhenries series peaking coil may be wound on 22KΩ resistor in this application.
Note 8. Complete assembly Part No. 79479.
* Use one winding only.
■ Parallel with 6.8KΩ resistor.
▲ Do not use tap winding.
◆ Terminals sufficient mtg. support & use one winding.
▲ Terminals sufficient mtg. support.
† Replaces horiz. Osc. & horiz. phase coils. Cut out chassis hole & drill mtg. holes.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ~(/)	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L54	.120ADC	39.4Ω	1.3 Hy.	77876	C5037 ①	C-2974	C-2238 ①	28C94 ①	C-32X

① Drill one new mounting hole.

RCA VICTOR MODELS 17-S-450R, RU, 17-S-451R, RU, 17-S-453R, RU, 21-S-500R, RU (Ch. KC893, A, B, C)

PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	RCA Victor PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.220ADC	100035	1236A	MR-300	6S300	6Q4	300	
M2	.220ADC	100035	1236A	MR-300	6S300	6Q4	300	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RCA Victor PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	3AG	3/10A 250V	78214	78218	312.300 (3AG-3/10A)	357001	AGC 3/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		RCA Victor PART No.	SYLVANIA PART No.	
M4	K60	79985	1N60 or 1N132	Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M5	Tuner	KRK-32A	VHF- Chassis KCS93 & KCS93B
M6	Tuner	KRK-33A	VHF-UHF - Chassis KCS93A
	Tuner	KRK-33	VHF-UHF - Chassis KCS93C
M7	Printed Video IF Assy.	79479	
M8	Printed Sound IF Assy.	100041	
M9	Switch	100812	VHF-UHF - Chassis KCS93A, KCS93C
M10	Centering Device	76375	
M11	Ion Trap	76141	
A5	Trimmer Cap.	78220	Video IF Input Trimmer (5-70MMF)
B2	Trimmer Cap.	100034	Horiz. Drive (10-160MMF)
	Knob	79863	On-off-volume - Models 17S450R, 17S451R, 21S500R, 17S450RU, 17S451RU, 21S500RU
	Knob	100048	On-off-volume - Models 17S453R, 17S453RU
	Knob	79470	Picture - Models 17S450R, 17S451R, 17S450RU, 17S451RU
	Knob	79444	Picture - Models 17S453R, 17S453RU
	Knob	79862	Picture - Models 21S500R, 21S500RU
	Knob	79865	VHF Channel Selector - Models 17S450R, 17S451R, 21S500R
	Knob	100049	VHF Channel Selector - Model 17S453R
	Knob	79467	VHF Channel Selector & UHF Changeover - Models 17S450RU, 17S451RU, 21S500RU
	Knob	79426	VHF Channel Selector & UHF Changeover - Model 17S453RU
	Knob	79464	VHF Fine tuning - Models 17S450R, 17S451R, 17S453R
	Knob	79864	VHF Fine tuning - Model 21S500R
	Knob	79465	VHF Fine tuning & UHF tuning - Models 17S450RU, 17S451RU, 17S453RU, 21S500RU
	Knob	79866	Horiz. Freq. - Models 21S500R, 21S500RU
	Knob	79533	Horiz. Freq. - Models 17S450R, 17S451R, 17S453R, 17S450RU, 17S451RU, 17S453RU
	Knob	79132	Brightness & Vert. Hold - Models 21S500R, 21S500RU
	Knob	79133	Local-Distant - Model 21S500RU
	Knob	79867	Dummy - Model 21S500R
	Safety Glass	79688	Models 17S450R, 17S451R, 17S453R, 17S450RU, 17S451RU, 17S453RU
	Safety Glass	79322	Models 21S500R, 21S500RU

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HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16 and V17. Check fuse, M3. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T1, T3A, T4, C104, C106, C107, C108, R98 and other associated components.	Check L51, L52, C99, C100, C103, R95, R94 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15 and V16. Check M1 and M2. Check adjustments B2 and B3. Check R98, R108, C1, C103 and other associated components.

BLOOMING

Check by substitution V15, V16 and V17. Check M1 and M2. Check R98, R108, C103, T1, T3A and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video."

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound."

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set."

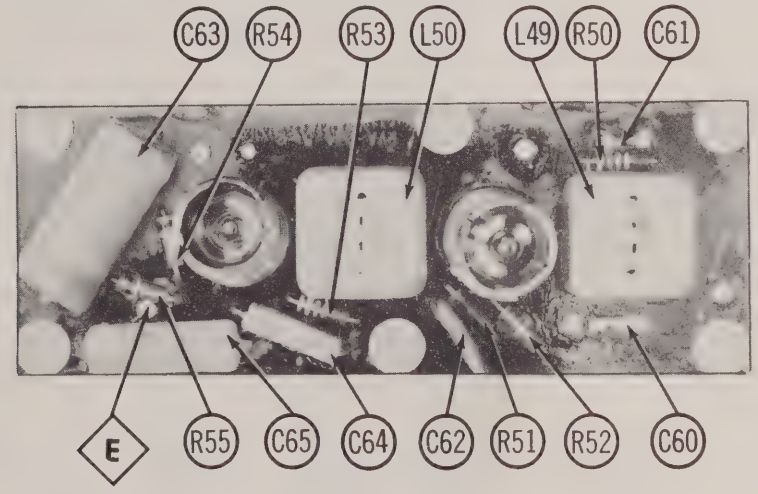
KEYSTONE EFFECT

Check T3 and its associated components.

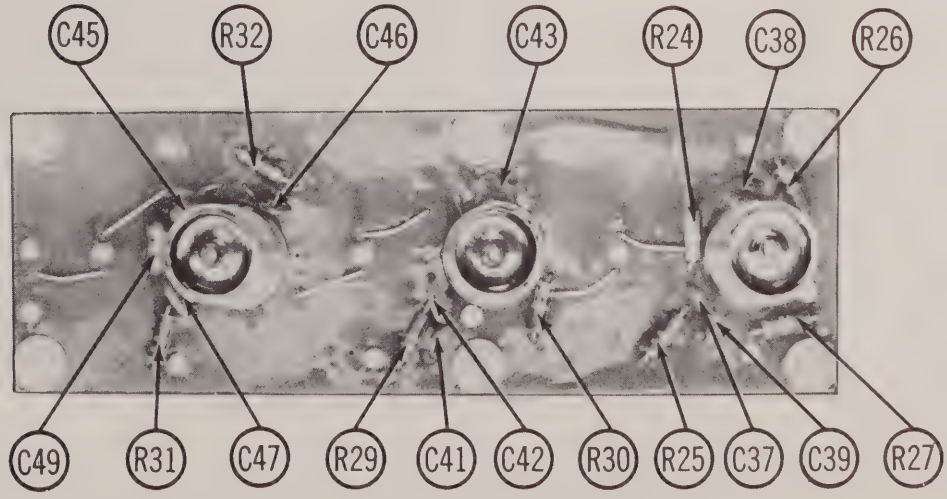
INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

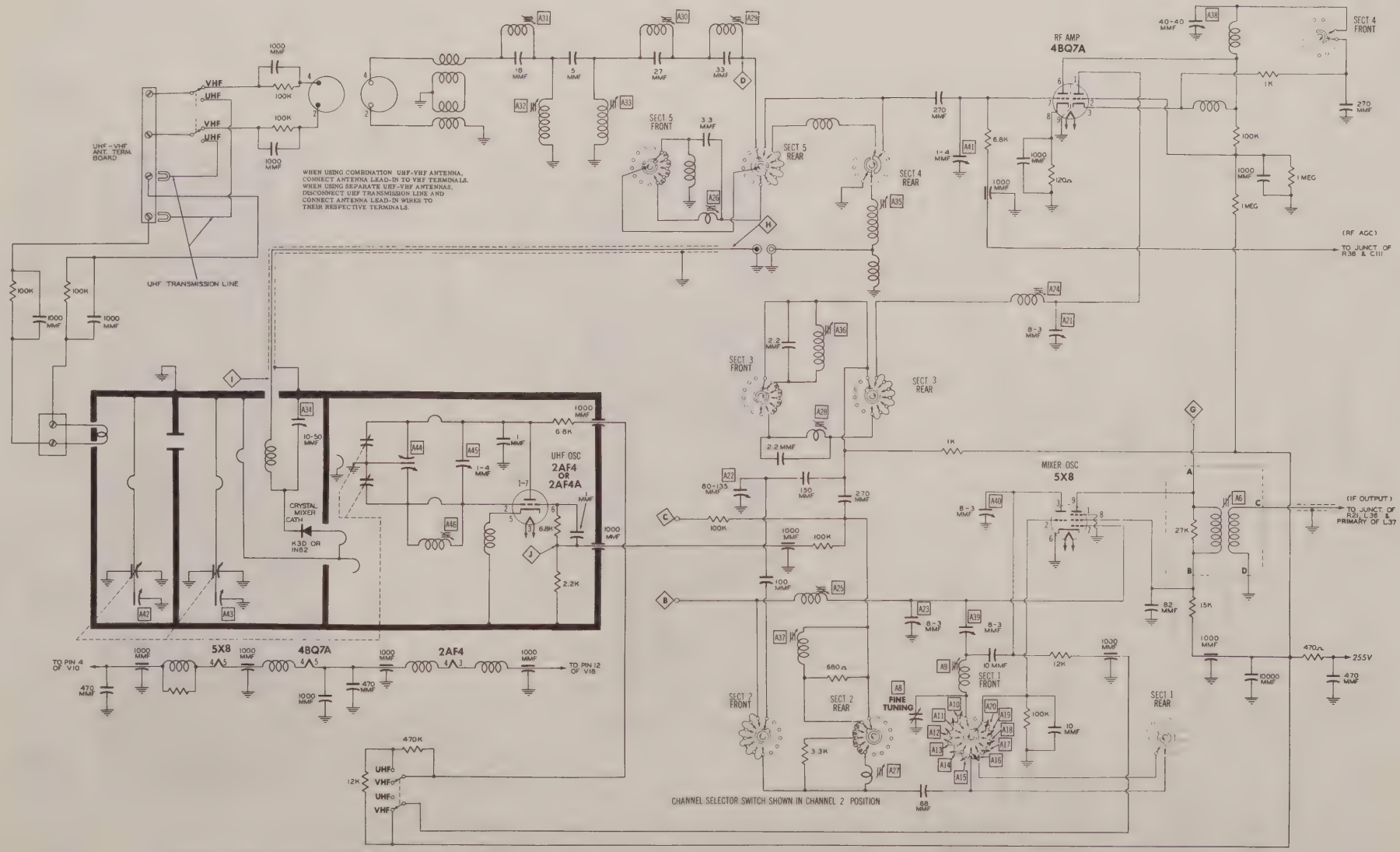
Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



SOUND IF SUB-CHASSIS



VIDEO IF SUB-CHASSIS



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UHF-VHF TUNER KRK 33 USED WITH CHASSIS KCS 93A AND KCS 93C

UHF-VHF TUNER SCHEMATIC

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

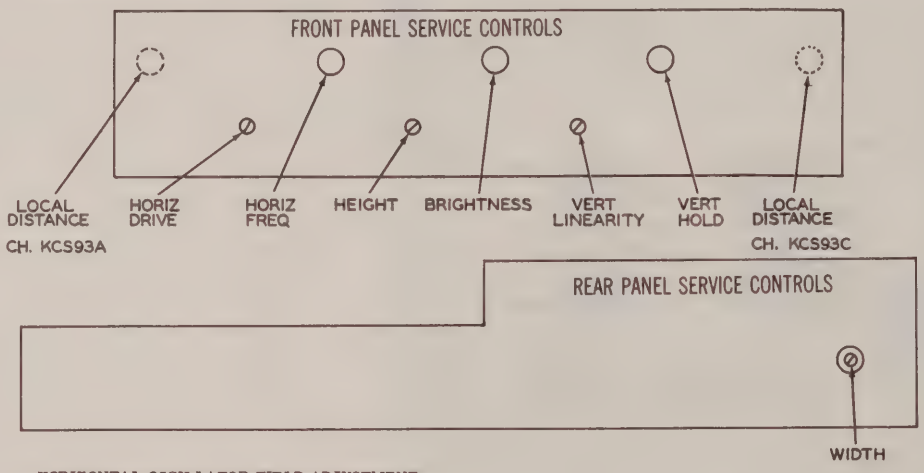
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove rear cover. Remove 10 metal clip springs holding metal trim to the front of cabinet. Remove metal trim and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from front panel of the chassis. Adjust the horizontal oscillator slug (L51) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L50) located on bottom chassis. (Hole is provided in bottom of cabinet for this adjustment).

FUSES

One fuse is used for horizontal and vertical sweep circuit protection.

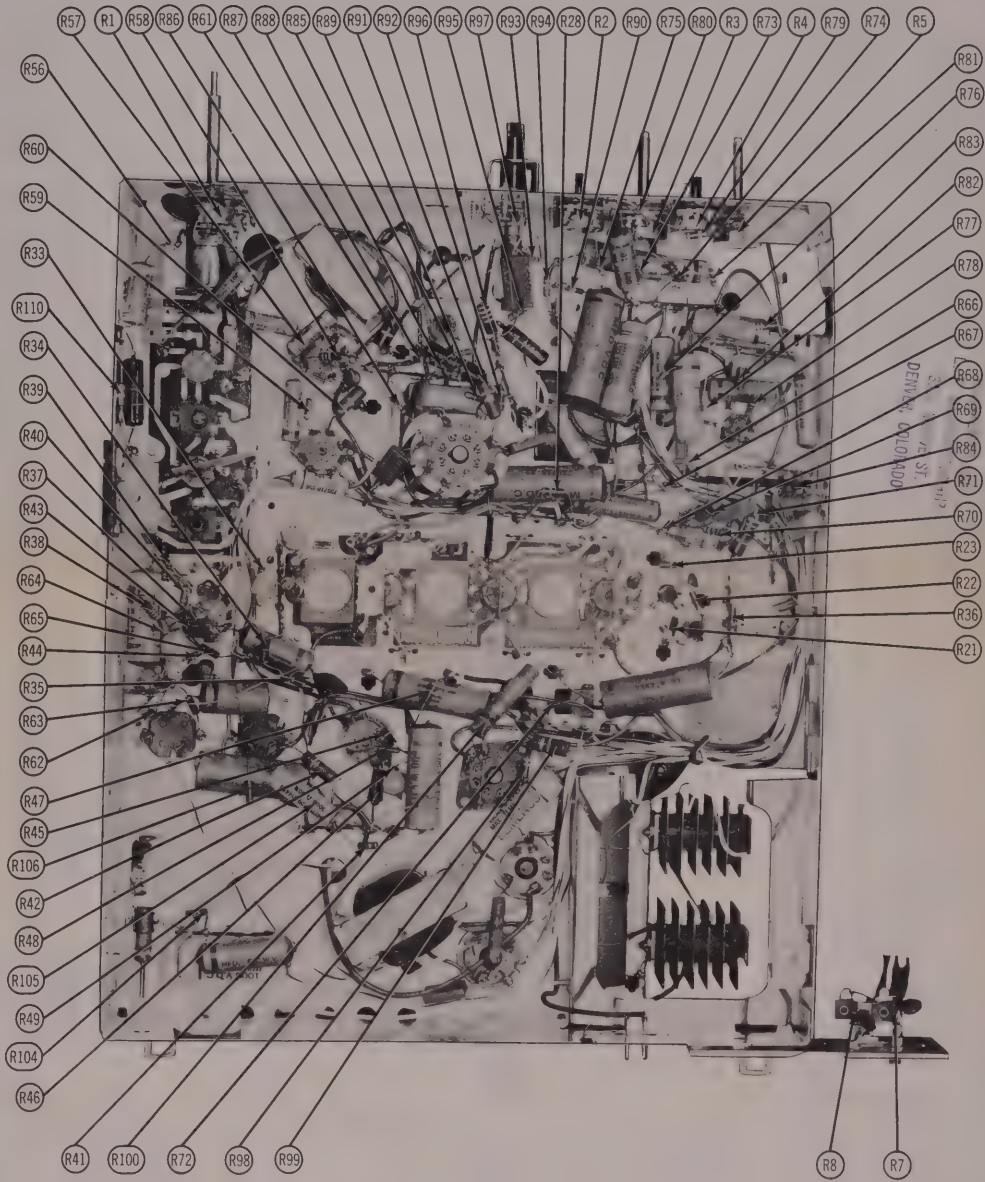
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet. Also remove "C" washer holding clear round plastic disc on channel selector shaft.
2. Remove 2 metal screws and 2 metal clip springs. Remove rear cover.
3. Disconnect speaker leads, picture tube socket, yoke plug, HV lead and ground strap (from HV cage).
4. Remove 5 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PHOTOFACT* Folder

RETMA MEMBER

DENVER, COLORADO

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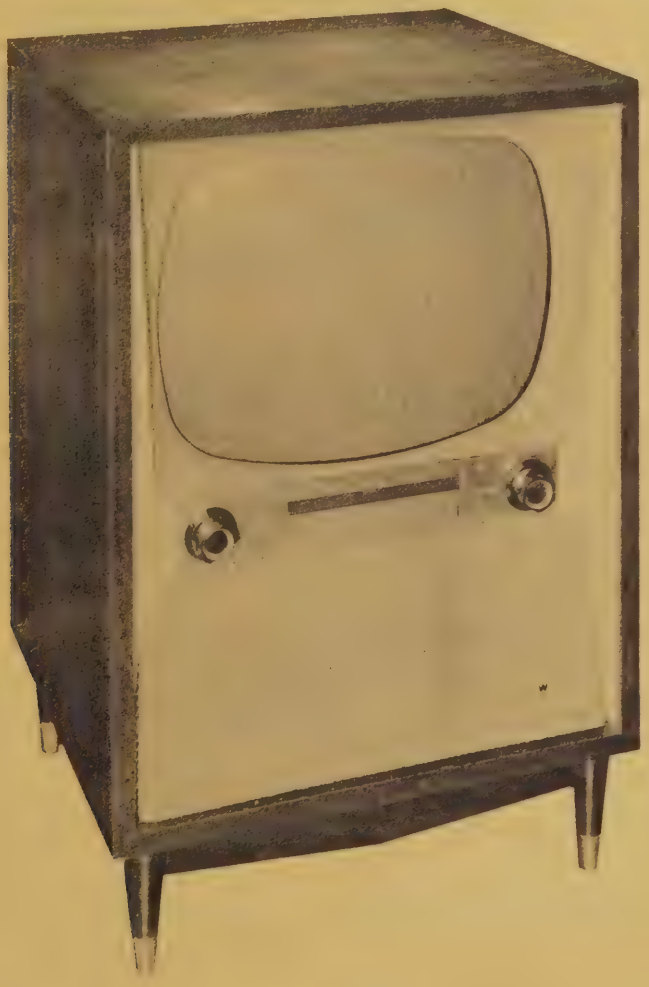

MODEL H-886K21(V)

WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)

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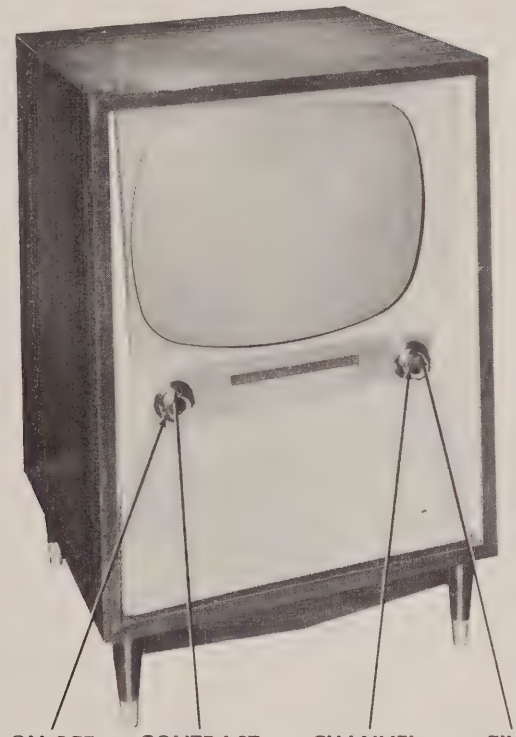

WESTINGHOUSE MODEL H-886K21(V) (Ch. 8-2315-21)

TRADE NAME	Westinghouse	MODELS	CHASSIS	TUNER
		H-882T21 (V), H-883T21(V), H-884K21(V), H-885K21(V), H-886K21(V), H-887K21(V), H-906K21(V), H-907K21(V)	V-2315-11, -21	V-15460-1
		H-882T21(S), H-883T21(S), H-884K21(S), H-885K21(S), H-886K21(S), H-887K21(S), H-906K21(S), H-907K21(S)	V-2315-15, -25	V-14170-2
		H-882TU21, H-883TU21, H-884KU21, H-885KU21, H-886KU21, H-887KU21, H-906KU21, H-907KU21	V-2325-101, -201	V-14130-1

MANUFACTURER	Westinghouse Electric Corp., Television & Radio Div., Metuchen, N.J.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.7 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 15 thru 18
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 14, 19
Photographs (Cont)
Trans., Inductor & Alignment Identification 23
Resistance Measurements 8
Servicing in the Field 22
Schematic (Alternate Tuners) 13, 20
Schematic (TV) 2
Trouble Shooting Aids 12, 21
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

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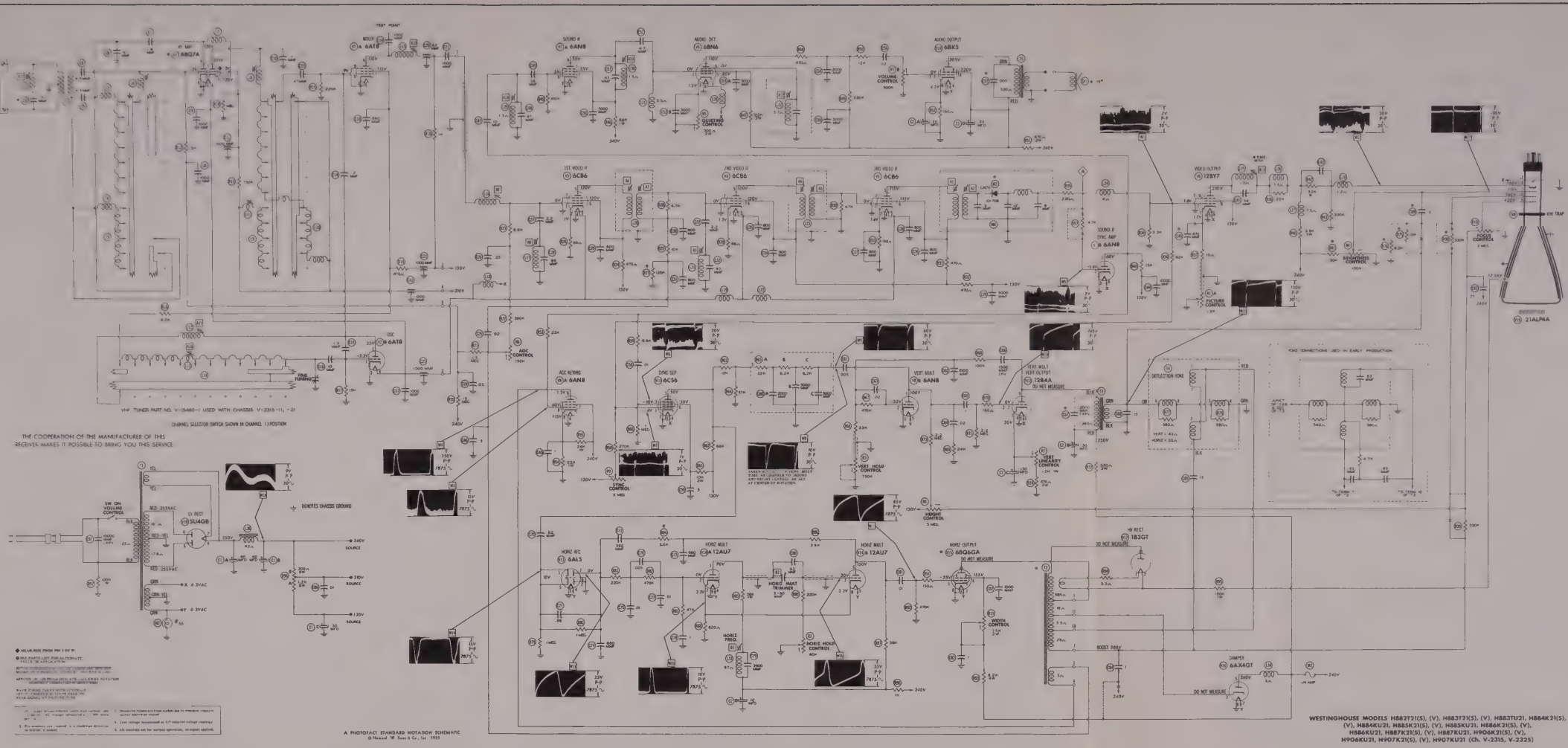
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
VHF TUNER PART NO. V-15480-1 USED WITH CHASSIS V-2315-11, -21
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
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WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)

H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325) SERIES MSR-HOOKUP-1

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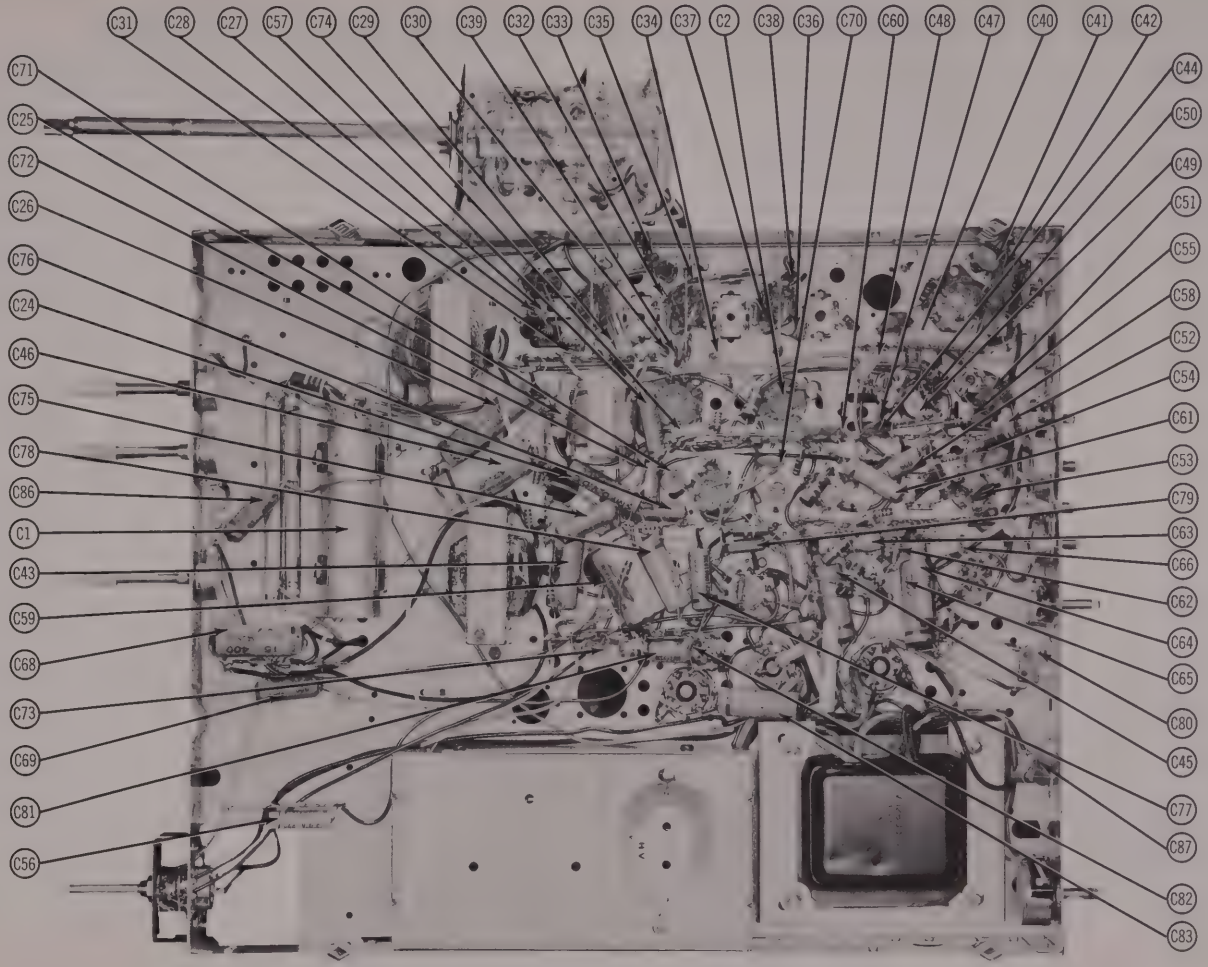
CHASSIS TOP VIEW

WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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WESTINGHOUSE MODELS H883T2(S), (V), H883T3(S), (V), H883TU21, H884K21(S), (V), H884KU21, H883K21(S), (V), H883KU21, H884K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H900K21(S), (V), H900KU21, H902K21(S), (V), H902KU21 (CH. V-2315, V-2323)

TUBE PLACEMENT CHART

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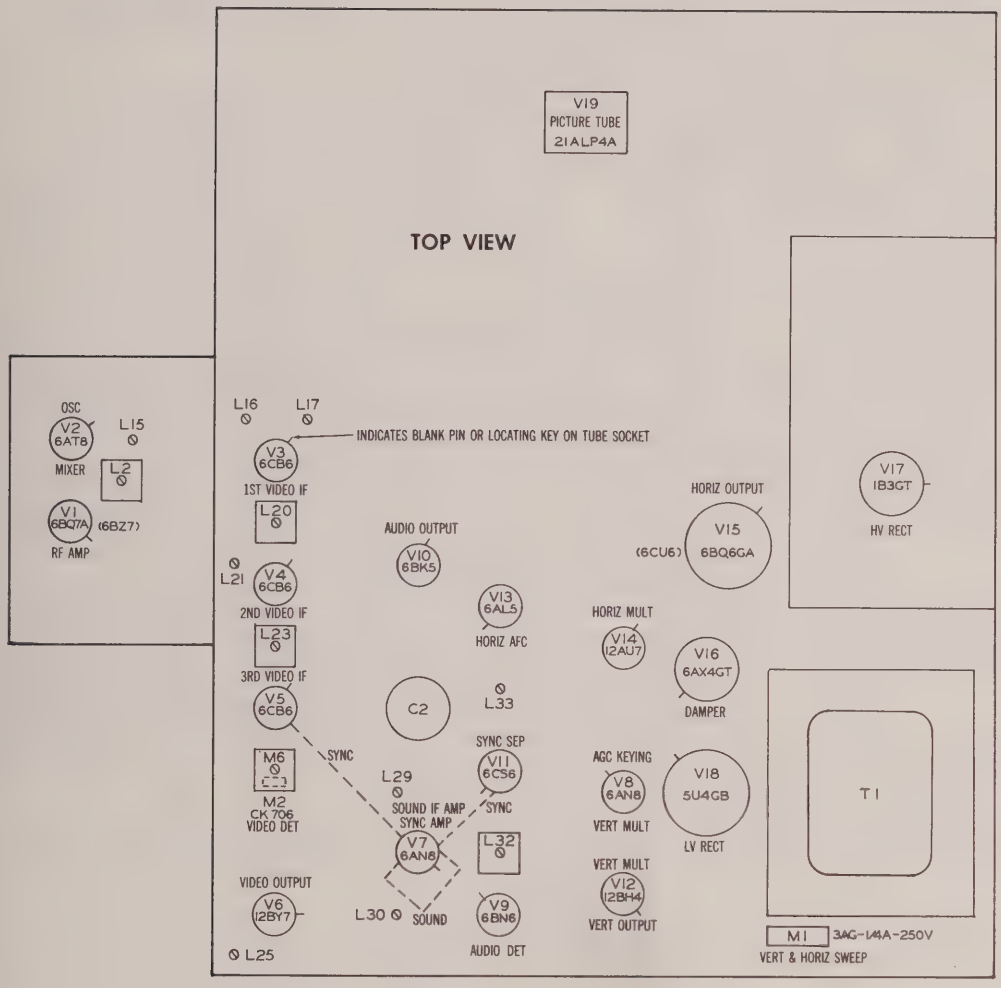


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V18

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V8, V19
Has pic, no sound - V7, V9, V10
Overloaded picture - V8

SYNC FAILURE
No vert. sync - V8, V11, V12
No horiz. sync - V11, V13, V14
No vert. or horiz. sync - V7, V11

SWEEP FAILURE
No raster, has sound -V14, V15, V16, V17, V19, Fuse (M1)
No vertical deflection - V8, V12
Poor vert. linearity or foldover - V8, V12
Poor horiz. linearity or foldover - V14, V15, V16
Narrow picture - V14, V15, V16, V17, V18
Vert. off freq. - V8, V11, V12
Horiz. off freq. - V11, V13, V14

WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V14) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove V1 from its socket to avoid possibility of undesirable beat response during alignment. Rotate channel selector knob to channel 13.
Connect a 470MMF capacitor across vertical input terminals of the scope. Connect the negative lead of a 9 volt bias supply to the ungrounded side of bias supply to the ungrounded side of C46. Connect the positive lead to chassis.
If a separate marker generator is used couple it loosely to sweep generator output cable.
If peaks appear at two different slug settings, use the one at farthest counter clockwise position.
Use high scope gain and only enough sweep generator output to provide useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis near V5.	44MC (10MC Swp)	42.25MC 43.0MC 44.0MC 45.0MC 45.75MC	13	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.	A1, A2	Attach detuning clips (use alligator clips) to pin 5 (plate) of V3 and V4. Adjust A1 for maximum response at 44MC. Adjust A2 for symmetrical response curve with markers as shown in Fig. 1. Remove detuning clips from V3 and V4.
2.	.02MFD	High side to pin 1 (grid) of V3. Low side to chassis near V3.	Not used	47.25MC (400∿Mod)	"	"	A3	Adjust for MINIMUM response on scope.
3.	Direct	High side to pin 1 (grid) of V4. Low side to chassis near V4.	44MC (10MC Swp)	42.25MC 43.0MC 44.0MC 45.0MC	"	"	A4, A5	Attach detuning clip to pin 5 of V3. Adjust A4 for maximum gain at 44MC. Adjust A5 for symmetrical response with marker as shown in Fig. 2. Remove detuning clip from V3.
4.	"	High side to pin 1 (grid) of V3. Low side to chassis near V3.	"	41.25MC 42.25MC 43.0MC 44.0MC 45.0MC 45.75MC 47.25MC	"	"	A6, A7, A10	Detune A10 on tuner several turns counter clockwise. Adjust A6 for maximum response at 44MC. Adjust A7 for symmetrical response with markers as shown in Fig. 3. Adjust A10 so that dip it produces on response curve is centered at 44MC. Replace V1 in tuner.
5.	Fig. 5	Thru matching network (Fig. 5) across antenna terminals. Keep leads as short as possible.	213MC (10MC Swp)	41.25MC 42.25MC 43.0MC 44.0MC 45.0MC 45.75MC 47.25MC	"	"	A8, A9	Set fine tuning control to its mid-range position. Clip the high side of the marker generator to the converter (V2) tube shield. Leave low side disconnected. Adjust A8 for symmetrical response as shown in Fig. 4. Adjust A9 for MINIMUM marker amplitude at 41.25MC. Response curve should be satisfactory on all other channels.

4.5MC TRAP ALIGNMENT

Set contrast control for maximum contrast.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any unused channel	DC probe thru detector probe (Fig. 6) to pin 11 (cathode) of picture tube. Common lead to chassis.	A-11	Adjust for MINIMUM deflection on VTVM.

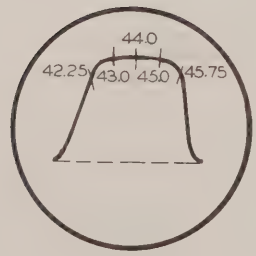


FIG. 1

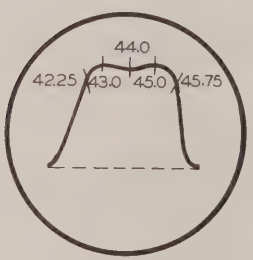


FIG. 2

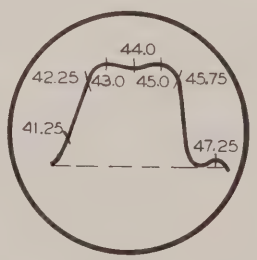


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (15KC Swp)	4.5MC	Any Unused Channel	Vert. Amp. across volume control	A12	Set generator for a strong signal and adjust A12 for maximum response at 4.5MC.
8.	"	"	"	"	"	"	A13, A14	Set generator to give MINIMUM useful indication on scope. Adjust A13 and A14 for maximum response centered about 4.5MC. Retouch A12 for maximum response at 4.5MC.
9.	"	"	Not used	4.5MC (400%Mod)	"	"	R5	Starting with very low signal input gradually increase the signal at the same time rotating the quieting control (R5) back and forth until the signal level reaches the point where the AM output on scope dips to zero with a rise on each side as R5 is rotated. Set R5 for zero output at this signal level.

SOUND IF ALIGNMENT USING TV SIGNAL

Tune the receiver to a TV station and connect an attenuator between receiver and antenna so that the signal input to receiver may be varied from weak to strong.
Set the quieting control (R5) to its mid-range position. Apply a strong signal and adjust A12 for maximum program sound. If two widely separated peaks appear use the one with A12 farthest counter clockwise. If two peaks occur within a narrow range of adjustment, the signal strength being applied is too low or the quieting control is improperly adjusted.
Reduce the signal to its lowest useable level and adjust A12, A13 and A14 for maximum program sound. If two peaks appear at different slug settings use the one at farthest counter clockwise position. Readjust the signal input to its lowest useable level and recheck settings of A13 and A14. Apply a very weak signal and adjust R5 for minimum noise. Do not leave R5 at maximum counter clockwise position.

VHF OSCILLATOR ALIGNMENT FOR TUNER V-15460-1.

Set the fine tuning control to the center of its range. This is indicated by the slot in the shaft being straight up and down. Set the channel selector to the highest high band channel (7-13) station operating in that area. Adjust the high band oscillator adjustment (A15) for best picture detail.
Set the channel selector switch to the highest low band channel (2-6) operating in that area. Adjust the low band oscillator adjustment (A16) for best picture detail. Recheck the setting of A15 and if it has changed repeat the entire procedure.

VHF RF AND MIXER ALIGNMENT FOR TUNER V-15460-1

The RF and Mixer portion of this tuner has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

UHF TUNER ALIGNMENT

The UHF portion has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

IF WAVE TRAP ADJUSTMENT

The IF wave trap (L1) has been added to the V-15460-1 tuner, located on top of tuner chassis.
The trap should be tuned to minimize interference caused by signals which fall within the video IF band pass (40-48MC). Tune in a TV station on which the interference is noted and adjust A17 for minimum interference in the picture. A17 is preset at the factory for 44MC.

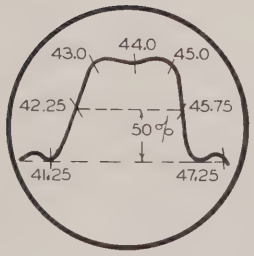
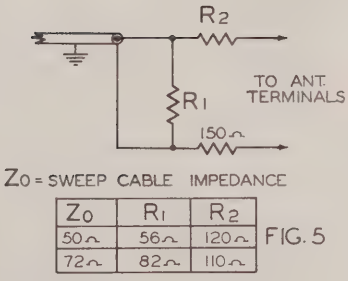


FIG.4



Z_0 = SWEEP CABLE IMPEDANCE

Z_0	R_1	R_2
50Ω	56Ω	120Ω
72Ω	82Ω	110Ω

FIG. 5

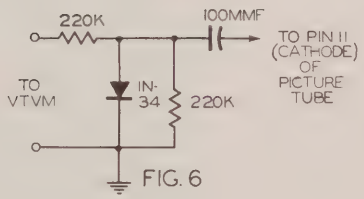


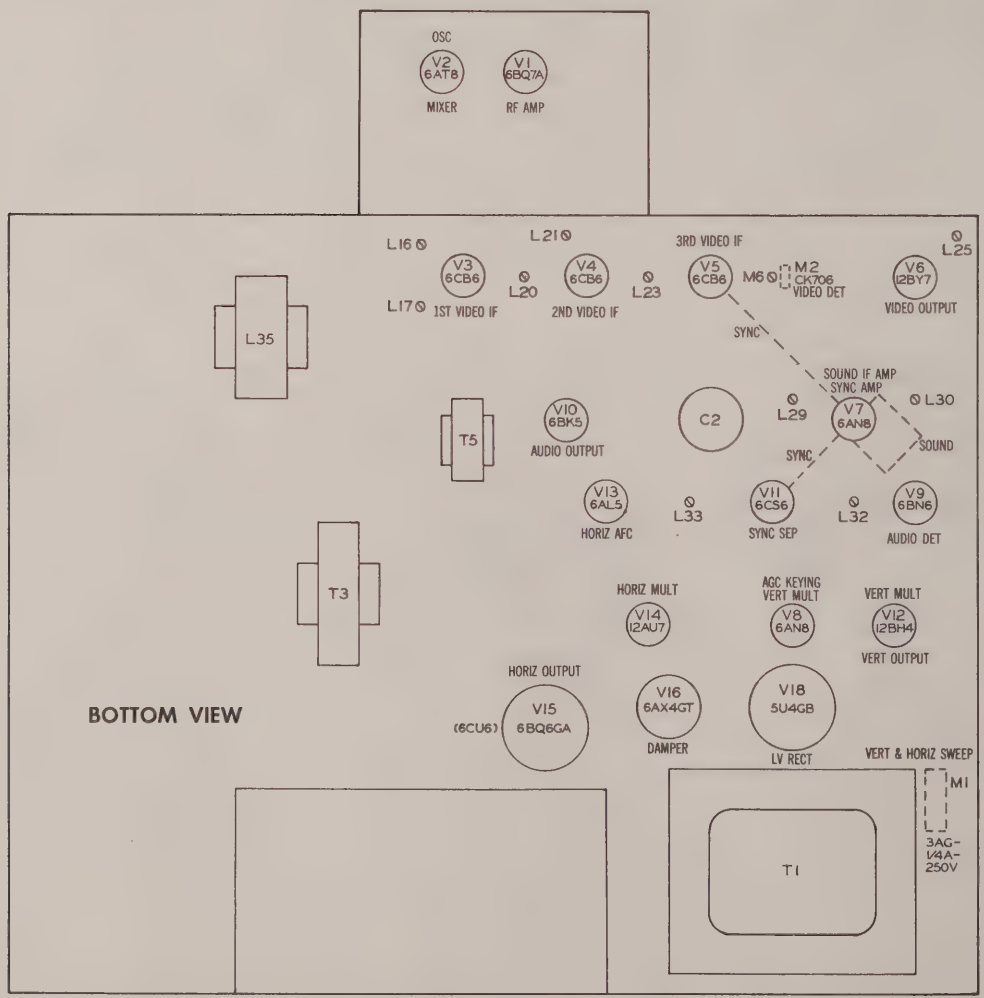
FIG. 6

WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)

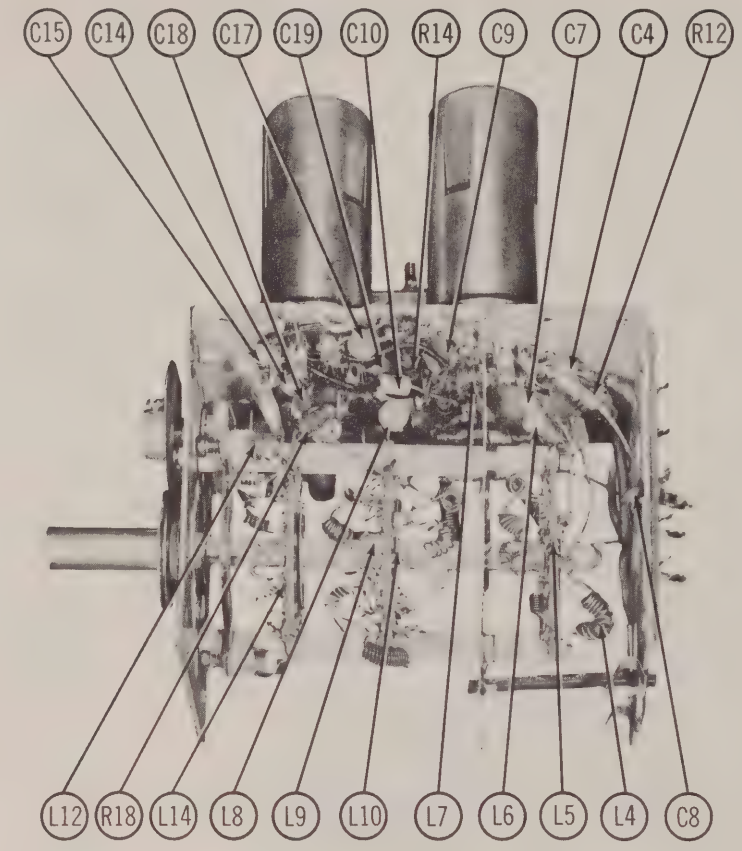
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	†350Ω	460KΩ	INF	.1Ω	0Ω	INF	1.8Meg	0Ω	0Ω
V 2	6AT8	15KΩ	†10KΩ	0Ω	.1Ω	0Ω	†2.5KΩ	†2KΩ	0Ω	220KΩ
V 3	6CB6	125KΩ	68Ω	.1Ω	0Ω	†2KΩ	†2KΩ	0Ω		
V 4	6CB6	130KΩ	68Ω	.1Ω	0Ω	†2KΩ	†2KΩ	0Ω		
V 5	6CB6	.3Ω	150Ω	.1Ω	0Ω	†2.5KΩ	†2.5KΩ	0Ω		
V 6	12BY7	170Ω	3.3KΩ	0Ω	.1Ω	.1Ω	0Ω	†4KΩ	†1.6KΩ	0Ω
V 7	6AN8	†17KΩ	8KΩ	0Ω	.1Ω	0Ω	†68KΩ	†68KΩ	100KΩ	0Ω
V 8	6AN8	†2.5Meg	850KΩ	0Ω	0Ω	.1Ω	550KΩ	†50Ω	†40KΩ	†18KΩ
V 9	6BN6	250Ω	5.5Ω	.1Ω	0Ω	†22KΩ	5.7Ω	†330KΩ		
V 10	6BK5	†1KΩ	NC	250KΩ	.1Ω	0Ω	150Ω	250KΩ	†550Ω	TP
V 11	6CS6	85KΩ	0Ω	0Ω	.1Ω	†50KΩ	†12KΩ	1Meg		
V 12	12B4A	1.2KΩ	2.2Meg	.1Ω	0Ω	0Ω	NC	2.2Meg	NC	†650Ω
V 13	6AL5	1Meg	0Ω	0Ω	.1Ω	1Meg	0Ω	2Meg		
V 14	12AU7	†57KΩ	2.7Meg	820Ω	.1Ω	.1Ω	†57KΩ	270KΩ	820Ω	0Ω
V 15	6BQ6GA	NC	0Ω	NC	†9KΩ	470KΩ	NC	.1Ω	0Ω	TOP CAP ▲18Ω
V 16	6AX4GT	TP	TP	1.5Meg	NC	†53Ω	NC	.1Ω	0Ω	
V 17	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲700Ω
V 18	5U4GB	NC	30KΩ	NC	16Ω	NC	18Ω	NC	30KΩ	
V 19	21ALP4A	0Ω	†50KΩ	PIN 6 ▲330KΩ	PIN 10 ▲330KΩ	PIN 11 †110KΩ	PIN 12 .1Ω			

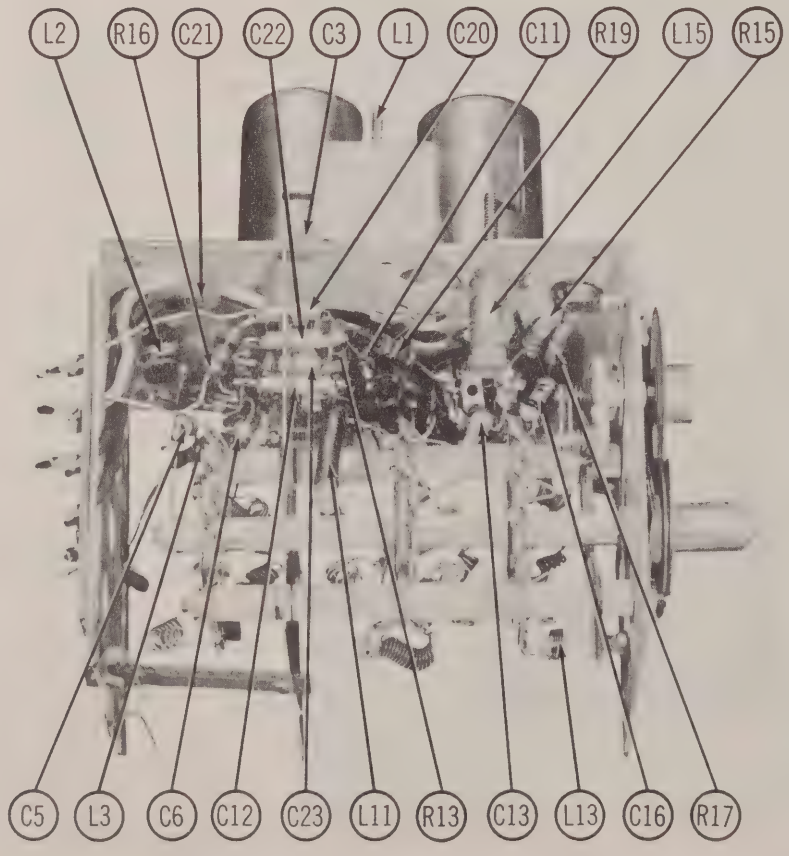
† MEASURED FROM PIN 8 OF V18
▲ MEASURED FROM PIN 3 OF V16
TP - TIE POINT
NC - NO CONNECTION



TUBE PLACEMENT CHART

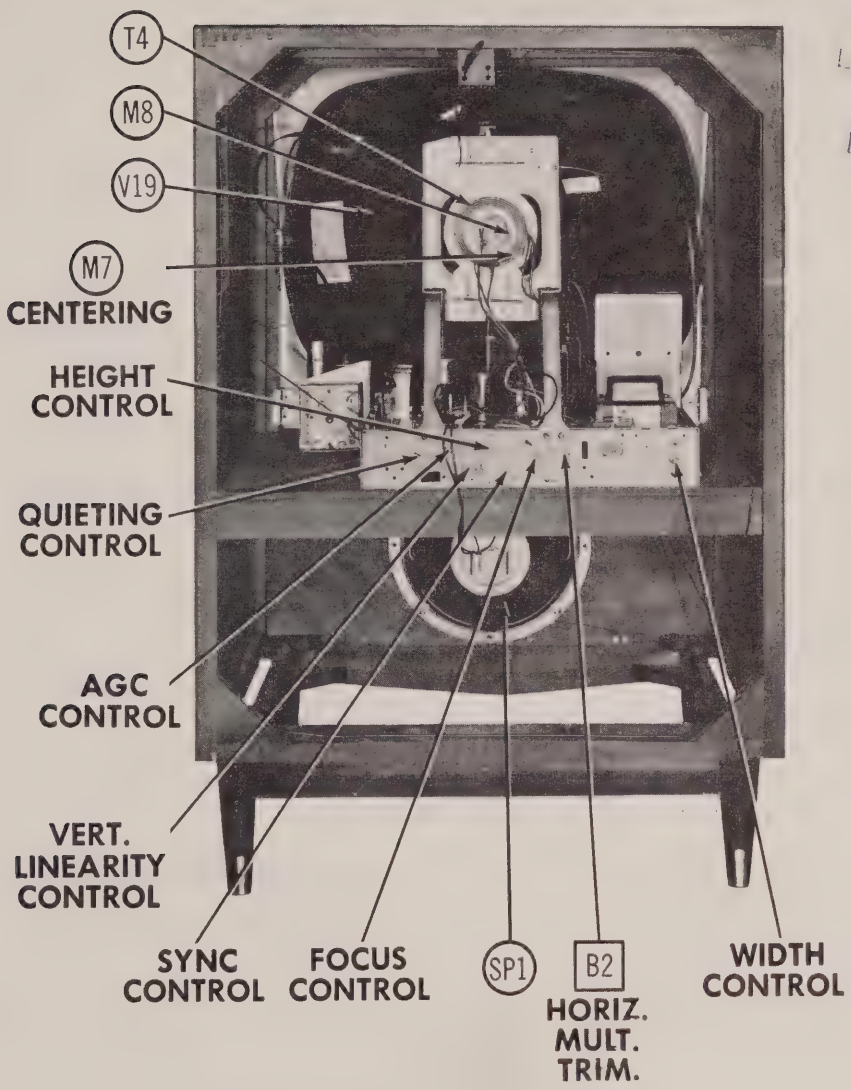


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

PROPERTY OF
L. F. [illegible]
[illegible] ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal hold control to its mid-range position.
2. Connect a short jumper across L33.
3. Connect the DC probe of VTVM to pin 2 (grid) of V14. Connect common lead to chassis. Adjust horizontal multivibrator trimmer (B2) for zero volts on VTVM.

   If necessary, readjust horizontal hold control slightly to obtain zero reading on VTVM.
4. Remove jumper from L33 and adjust B1 for zero reading on VTVM. Switch off channel and back again. Picture should pull into sync.

   Adjust the horizontal width control for a picture that is slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V18. Check adjustment R11. Check T2, T4A, C80, C81, R93 and other associated components.

DRIVE LINES

Check by substitution V15 and V16. Check T2, T4A, C81, R93 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines."

PIE CRUST EFFECT

Check by substitution V14, V15 and V16. Check C77 for open. Check C75, C76, C78, R82, L33 and other associated components.

XMAS TREE EFFECT

Check by substitution V14, V15 and V16. Check T2 and T4 for internal arcing. Check L33, C79, C74, C71, C72, R85 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V8 and V12. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R72, R74, C2B and other associated components.	Check C61, C63, C66, R73, R39, R8, R66 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V8 and V12. Check height and vertical linearity controls for proper operation. Check R73, T3 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V8 and V12. Check R73, R8, C63, C66 and other associated components.

COMPRESSED AT TOP

Check by substitution V8 and V12. Check C2C, R74, R7, T3 and other associated components.

FOLDS

Check by substitution V8 and V12. Check C64, C66, R69, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V11. Check C58, C59, R61, R62, R9 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V8. Check vertical integrator network. Check C62, C63, C61, R66, R3 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V13 and V14. Check C70, C75, C77, C78, R82, R85, L33 and other associated components.

HORIZONTAL BENDING

Check by substitution V8, V11, V13 and V14. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check R39, R40, C42, L27 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A-11. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control Check C42, C41, L26, R36 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check L24, L26, L28, C42 and other associated components.

SMEAR

Substitute V6. Check video crystal detector network. Check L24, L26, L28 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V9 and V10. Check stages V9 and V10 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C56, C57, C2A, C1D, R51, R49, R48, T5, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments, R5 and A12 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound."

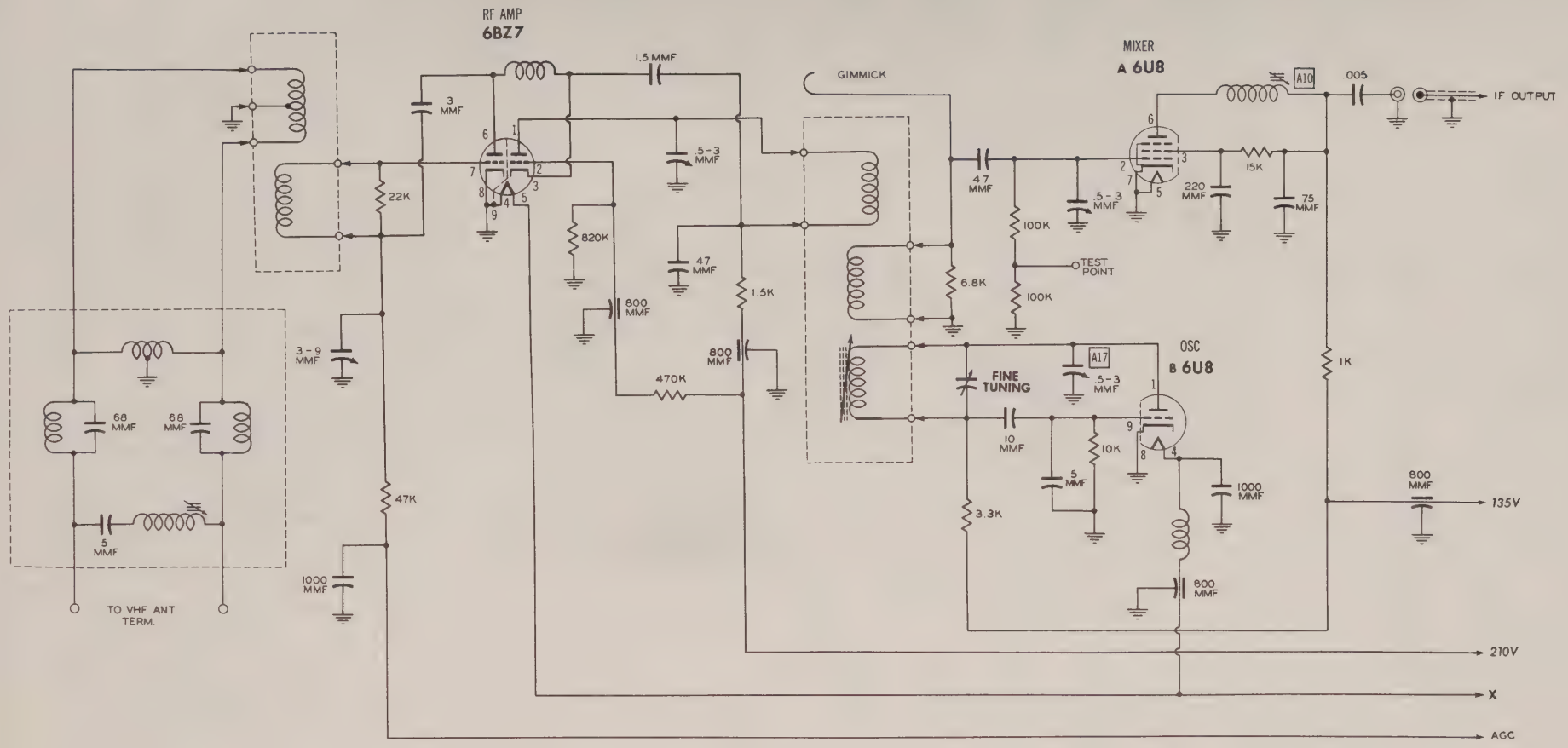
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V18. Check B+ filter and decoupling network.

SMALL AND/ON DIM PICTURE

Substitute V18. Check B+ filter and decoupling network.



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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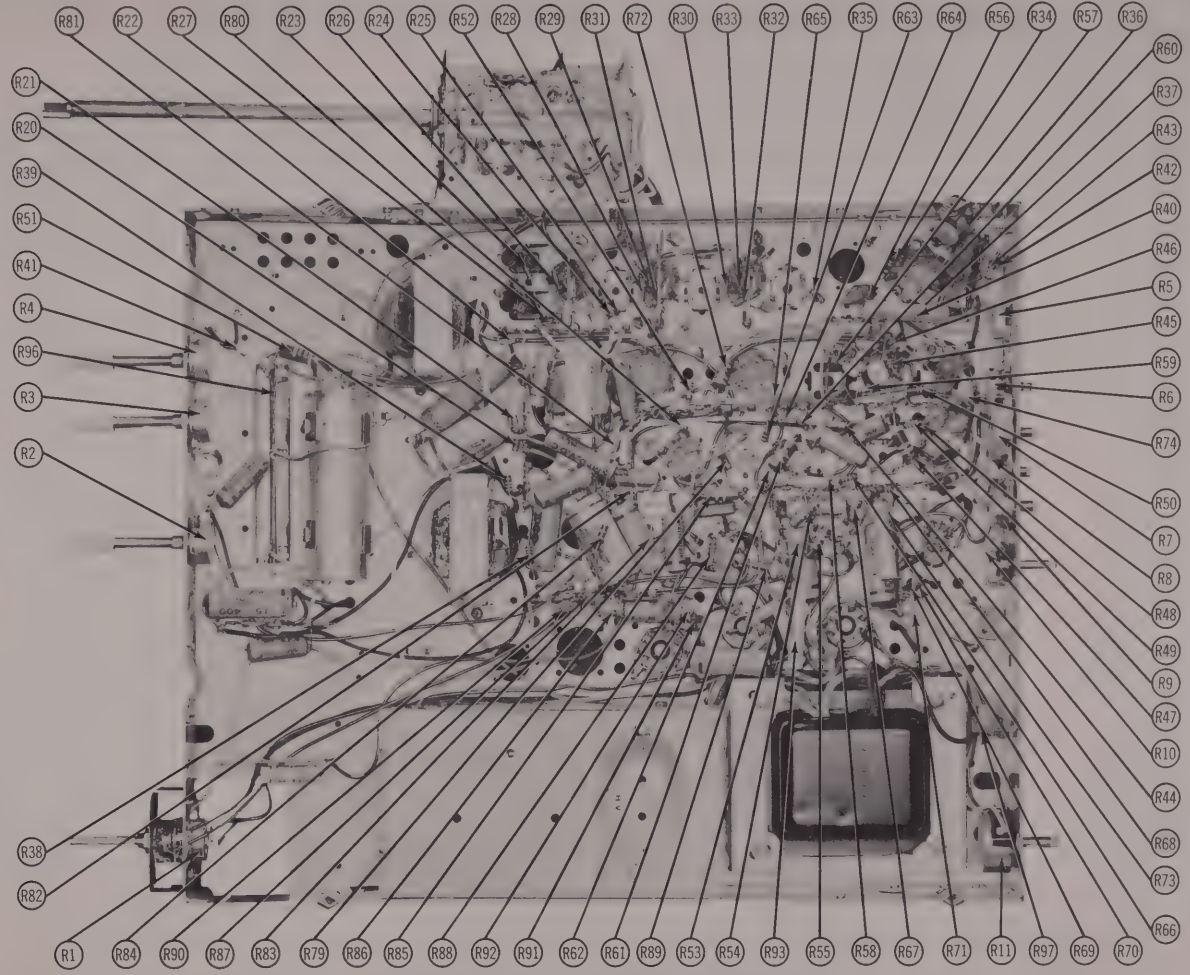
RF TUNER - PART No. V-14170-2 - USED IN Ch. V-2315-15, -25

WESTINGHOUSE MODELS H88212T(S), (V), H88372T(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. E
DENVER, COLORADO

WESTINGHOUSE MODELS H818T21(S), (V), H818T21(S), (A), H818TU21, H818K21(S), (A), H818KU21, H895K21(S), (V), H853KU21, H886K21(S), (V), H896KU21, H897K21(S), (V), H897KU21, H906K21(S), (A), H906KU21, H907K21(S), (V), H907KU21 (CH. V-23215, V-23235)

PARTS LIST & DESCRIPTION

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Westinghouse PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BQ7A	6BQ7A	9AJ	6BZ7 used as alternate.
V2	Mixer-Osc.	6AT8	6AT8	9DW	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	Sound IF Amp. - Sync Amp.	6AN8	6AN8	9DA	
V8	AGC Keying-Vert. Mult.	6AN8	6AN8	9DA	
V9	Audio Det.	6BN6	6BN6	7DF	
V10	Audio Output	6BK5	6BK5	9BQ	
V11	Sync Sep	6CS6	6CS6	7CH	
V12	Vert. Mult. -Vert. Output	12B4A	12B4A	9AG	
V13	Horiz. AFC	6AL5	6AL5	6BT	
V14	Horiz. Mult.	12AU7	12AU7	9A	
V15	Horiz. Output	6BQ6GA	6BQ6GA	6AM	6CU6 used as alternate.
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rect.	1B3GT	1B3GT	3C	
V18	LV Rect.	5U4GB	5U4GB	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Westinghouse PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	21ALP4A ①	21ALP4A ① 21ALP4	21ALP4A ①	21ALP4A② 21ALP4	21ALP4A ① 21ALP4	12L 12L	① Aluminized ② Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Westinghouse PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	V-9891-1	FP428.4	TM-4030	Q-325	
B	■40	450					
C	▲30	350					
D	30	350					
C2A	30	50	V-11535-1		TM-4115	T-815	
B	▲30	500				FM-15150	
C	▲150	50					
D	■10	450					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	.51						Note 1
C4	4.3						
C5	4.3						
C6	5.1						
C7	1.6						
C8	1000			DD-102	801-001	DC-521	
C9	1000			DD-102	801-001	DC-521	
C10	1			TCZ-1	NP0A-010		
C11	1000						
C12	1000						
C13	47			D6-470	GP1K-470	UC-5447	
C14	2			TCZ-2R2	NP0A-2R2		
C15	1.5						
C16	10			TCZ-10	NP0K-100	ZT-541	
C17	1000			DD-102	801-001	DC-521	
C18	680			D6-681	GP2K-681	UC-5368	
C19	1000			DD-102	801-001	DC-521	
C20	82						
C21	1000			DD-102	801-001	DC-521	
C22	1000						
C23	1000						
C24	.05	400	RCP10W4503M	DF-503		PT415	
C25	.02	600	RCP10M6203M	DF-203	817-02	PT612	
C26	.25	400	RCP10W4254M			PT4025	
C27	2.2		V-8963-2296	TCZ-2R2	NP0A-2R2		
C28	68		R1CC20S2L680K	D6-680	801-680		
C29	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C30	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C31	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C32	2.2		V-8963-2296	TCZ-2R2	NP0A-2R2		
C33	47		R1CC20S2L470K	D6-470	831-470	ZT-5447	
C34	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C35	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C36	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C37	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C38	800		R2CC61Z5Z801P	DD-801	831-801	DC-521	
C39	5000		R2CC62Z5Z502P	DD-502	811-005	DC-525	
C40	470		R2CC61Y5Y471M	DD-471	831-471	UC-5347	Note 1
C41	56		RCM20B560K				
C42	.1	400	RCP10M4104M	DF-104		PT401	
C43	.25	400	RCP10W4254M			PT4025	
C44	10000		R2CC63Y5Y103P	DD-103	811-01	DC-511	
C45	.1	400	RCP10W4104M	DF-104		PT401	
C46	.5	400	RCP10W4504M			PT405	
C47	10		R1CC61R2G100K	DD-100	831-100	UC-541	
C48	47	500	R1CC61R2G470K	D6-470	841-470	MCB225	
C49	56		R1CC62R2G560K	DD-560	831-560	UC-5456	
C50	5000		R2CC62Z5Z502P	DD-502	811-005	DC-525	
C51	47	500	R1CC61R2G470K	D6-470	831-470	MCB225	
C52	4.7		V-8963-4796	TCZ-4R7	NP0A-4R7	ZT-555	
C53A	5000		V-9044-1	DD2-502	811-005	DC-525	
B	5000				811-005	DC-525	

PROPERTY OF L. F. [illegible]

WESTINGHOUSE MODELS H882T21(S), (V), H883T21(S), (V), H883TU21, H884K21(S), (V), H884KU21, H885K21(S), (V), H885KU21, H886K21(S), (V), H886KU21, H887K21(S), (V), H887KU21, H906K21(S), (V), H906KU21, H907K21(S), (V), H907KU21 (Ch. V-2315, V-2325)

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C54	2000		R2CC63Y5Y203M	DD-302	801-003	DC-522	
C55	5000		R2CC63Z5Z502P	DD-502	811-005	DC-525	
C56	.02	600	RCP10M6203M	DP-303	817-03	PT613	
C57	.005	600	RCP10M6503M	D6-502	GP2-333-502	PT625	Note 2
C58	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	
C59	.5	400	RCP10W4504M			PT705	
C60A	2000					DC-522	
B	5000		♦V-8513-1	♦PC-100	♦1405-01	DC-525	
C	5000					DC-525	
C61	.005	600	R2CC63Y5Y502M	D6-502	GP2-333-502	PT625	
C62	1000		R2CC63Y5Y102M	DD-102	801-001	DC-521	
C63	.02	600	RCP10M6203M	DP-303	817-02	PT613	
C64	.02	600	RCP10M6203M	DP-303	817-02	PT613	
C65	.1	400	RCP10M4104M	DP-104		PT401	
C66	1500	1000	V-10710-13	DD-152	IR5KV-152	MCK215	
C67	2000	1400	V-10710-17	DD30-202	IR5KV-202	MCK230	Note 3
C68	.15	400	RCP10M4154M			PT401S	
C69	.01	600	RCP10WF103M	D6-103	GP2-333-103	PT611	Note 4
C70	82		R2CC62K2G820K				
C71	68		R2CC62K2G680K				
C72	390	500	RCM30B394K	D6-391	811-391	MCH243	
C73	680	500	RCM30B684K	D6-681	811-681		
C74	680	500	RCM30B684K	D6-681	811-681		
C75	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	
C76	.005	600	RCP10M6503M	D6-503	GP2-333-503	PT625	
C77	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	
C78	.1	400	RCP10W4104M	DP-104		PT401	
C79	3900	300	RCM30C392K			MCH243	
C80	82	500	RICC62B2G820K	D6-820	801-820		
C81	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	
C82	1000		R2CC63Y5Y102M	DD-103	801-001	DC-521	
C83	.1	400	RCP10M4104M	DP-104		PT401	
C84	.1	400	RCP10M4104M	DP-104		PT401	
C85	.15	400	RCP10M4154M			PT401S	
C86	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	
C87	10000	1400	V-10710-13				

Note 1. Used on late production only.
Note 2. Early production chassis use mica capacitor in this application (part #R2CC63Y5Y502M).
Note 3. Not used in late production chassis.
Note 4. Some versions use .1MFD in this application (part #RCP10W4104M).
♦ Items C60A, C60B, C60C, R65A, R65B and R65C are combined in one unit.
Late production use MFgr. part #V-15686-1.

CONTROLS

ITEM No.	RATING RESIST ANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1500Ω	½	V9677-12	QJ-635†	RTV-316	F1-7	UF152R	Picture (Panel)
B	500KΩ	½				UR65A	UR65A	Volume (Rear)
C	Switch					U8-36	KD-1	Attach to RIB.
R2A	80KΩ	½	V11538-3	QH-126	A47-78K-8	AB-36	U-36	Horizontal Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.
R3A	750KΩ	½	V11539-3	QH-128	A47-1Meg-8	AB-89	U-54	Vertical Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A.
R4A	100KΩ	½	V11536-3	QH-128	A47-100K-8	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A.
R5	500Ω	2	V11545-3		39-500			Quieter (W/Ire Wound)
R8A	750KΩ	½	V12709-10	QH-126	A47-750K-8	AB-86	TA16L	AGC
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A.
R7A	1200Ω	½	V14753-3		3YCL-1000-S	AB-5		Vertical Linearity
B	Shaft		Not Req.		Not Req.	AK-1		Attach to R7A.
R8A	5Meg	½	V12709-11	QH-141	A47-5Meg-S	AB-87	TA58L	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A.
R9A	5Meg	½	V12709-11	QH-141	A47-5Meg-S	AB-87	TA58L	Sync
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R9A.
R10A	2Meg	½	V12709-3	QH-129	A47-2Meg-S	BX-75	U-56	Focus
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R10A.
R11A	7500Ω	2	V12710-3	WK-7500	A43-7500	V-136	R7500L	Width
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R11A.

♦UNIVERSAL REPLACEMENT (MALLORY EXACT DUPLICATE PART NO. UR 1785).
†CONCENTRIKIT EQUIVALENT, K-3 KIT, BASE ELEMENT AND SHAFTS, B17-109, P1-123 (Panel) B13-133, R14-211 (Rear). T6-1 Switch

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	NOTES
R13	15KΩ	½			
R14	750KΩ 5%	½			
R14	1Meg				
R15	220KΩ	½			
R16	1000Ω	½		BTS-1000	
R17	15KΩ	½			
R18	820Ω	½		BTS-470	
R19	47KΩ	½			
R20	15Meg	½	RC20AE156M	BTS-15Meg	
R21	1.5Meg	½	RC28AE155J	BTS-1.5Meg	
R22	390KΩ	½	RC20AE394K	BTS-390K	
R23	6800Ω	½	V-9927-20		
R24	470Ω	½	RC20AE471M	BTS-470	
R25	10KΩ	½	RC20AE103M		
R26	680Ω	½	RC20AE680K	BTS-68	
R27	130KΩ	½		BTS-130K	Note 1
R28	4700Ω 5%	½	V-9927-3		
R29	68Ω	½	RC20AE680K	BTS-68	
R30	4700Ω 5%	½	V-9927-2		
R31	470Ω	½	RC20AE471M	BTS-470	
R32	470Ω	½	RC20AE471M	BTS-470	
R33	150Ω	½	RC20AE151K	BTS-150	
R34	3300Ω	½	RC20AE332K		
R35	220Ω	½	RC20AE221K		
R36	22KΩ	½	RC20AE223K		
R37	10Ω	½	RC20AE100K	BTS-10	
R38	330KΩ	½	RC20AE334K		Note 2
R39	390KΩ	½	RC20AE394K		

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	NOTES
R40	390Ω	5	V-9924-3	PWT-3900	
R41	150KΩ	½	RC20AE823K		Note 3
R42	150KΩ	½	RC20AE184K		Note 4
R43	330KΩ	½	RC20AE334K		
R44	15KΩ	½	RC20AE153K	BTS-15K	
R45	100KΩ	1	RC20AE104K	BTS-100K	
R46	470KΩ	1	RC20AE683K	1TA-68K	
R47	22KΩ	2	RC40AE223K	BTS-23K	
R48	47MΩ	½	RC20AE473M	BTS-47Meg	
R49	330KΩ	½	RC20AE334K	BTS-330K	
R50	12KΩ	½	RC20AE123K	BTS-12K	
R51	47MΩ	2	RC40AE473K	BTS-47Meg	
R52	150Ω	½	RC20AE151K	BTS-150	
R53	22KΩ	½	RC20AE223K	BTS-22K	
R54	22KΩ 5%	1	RC30AE223K	BTA-22K 5%	
R55	24KΩ 5%	1	RC30AE243J	BTA-24K 5%	
R56	82KΩ	½	RC20AE823K	BTS-82K	
R57	4700Ω	½	V-9927-3	BTS-4700	
R58	270KΩ	½	RC20AE274K		
R59	680KΩ	½	RC20AE684K		
R60	1Meg	½	RC20AE105K		
R61	10KΩ	2	RC40AE103K		
R62	68KΩ	½	RC20AE683K		
R63	12KΩ	½	RC20AE123K		
R64	47KΩ	½	RC20AE473K		
R65A	22KΩ				
B	8200Ω		♦V-8213-1		
C	6200Ω				

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	NOTES
R65	47KΩ	½	RC20AE473K		
R84	560KΩ	½	RC20AE103K		Note 5
R85	56KΩ	1	RC20AE563K		
R86	3900Ω	½	RC20AE392K		
R87	560Ω	½	RC20AE563K		
R88	820Ω	½	RC20AE821K		
R89	220KΩ	½	RC20AE224J		
R90	100KΩ	½	RC20AE103K		
R91	150Ω	½	RC30AE151K		
R92	470KΩ	½	RC30AE474K		
R93	8300Ω	4	V-12171-1	PW4-8200	
R94	3.3Ω	½	RHV33R3K	BTS-3.3	
R95	100KΩ	½	V-9927-18	BTA-100K	
R96A	1200Ω	6	V-10054-7	13/4 A-1200	
B	300Ω	6		13/4A-300	
R97	100KΩ	1	V-9927-12	BTA-100K	

Note 1. In some versions a 100KΩ, ½ watt resistor is used in this application.
Note 2. Not used in all versions.
Note 3. In some versions an 82KΩ, ½ watt resistor is used in this application.
Note 4. In some versions a 180KΩ, ½ watt resistor is used in this application.
Note 5. In some versions a 10KΩ, ½ watt resistor is used in this application.
♦ Items C60A, C60B, C60C, R65A, R65B, R65C are combined in one unit.
Later production use MFgr. part #V-15686 1.

TRANSFORMER (POWER)

ITEM No	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA Westinghouse PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	520VCT ①	5VAC	V-12805-5	P9739①	P-2830④			P-8167①	26R33③	R-81BC ②
	⑤ 1.7A	260ADC	⑥ 3A								
	SEC. 3	SEC. 4	SEC. 5								
	⑦ 6VCT										
	⑧ 5.1A										

① Series 6.3V ⑨ 4.5A and 8.5A windings for Sec. 3.
② Series 6.3V ⑨ 6A windings for Sec. 3, tape 6.3V ⑨ 1.2A winding.
③ Series 6.3V windings for Sec. 3, tape extra 5V winding.
④ Series 6.3V ⑨ 6A windings for Sec. 3, tape 6.3V ⑨ 1.25A winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	RATING	REPLACEMENT DATA Westinghouse PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.		V-15850-1 ① V-15324-1 ①	FB420 & RF800 * ②		X094 *②	A-8255 * ①	FLY-76 * ②	D-49②	
T3	Vert. Output Trans.		V-15325-1	Z1800 ②④	A-3823	V307	A-8142②	26872	A-108X	
T4A	Yoke (90°) Horiz.	(31MH)	V-15371-1④	DF607④	MDF-92		DY-16A	Y-16⑤⑥	Y-41-1⑤	
B	Vert.	(40MH)		④	⑤⑥		⑤⑥		⑥	

① Alternate part number.
② Drill new mounting hole(s).
③ Use 8 to 1 turns ratio.
④ Includes clamping device, resistors R77, R78.
⑤ Use original yoke clamping device. Use original rear cover and centering device.
⑥ Connect terminal #3 of horizontal yoke to terminal #10 of horizontal output transformer. Terminal #1 of yoke thru capacitor C85 to terminal #7 of horizontal output transformer. Connect horizontal damping network across terminals #3 and #7.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
1	5			8	5	5	
11	4			7	4	4	
10	3			7	4	4	
7	1			1	1	1	
4	Term. #1 of RF800			2	7	7	
3	Term. #2 of RF800			6	8	8	
Connect Width Coil Across	Term. #3 & #4 of RF800 across 4 & 3						
Special Notes	⑦⑧			⑦	⑦	⑦	

① In case of insufficient width, add capacity (approx. 65MMF ② 5KV) across horizontal yoke.
⑧ If AGC does not operate properly, reverse width coil primary or secondary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	7KΩ	3Ω	V-14080-3	Z1113 ①	A-3931 ①	A-3870①	26R46 ①	R-7X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	REPLACEMENT DATA Westinghouse PART No.	CRAM PART No	NOTES
SP1	10" 1 1/4"	PM PM	3Ω 3Ω	V-9770-1 ① V-10030-1 ①	10A31 5BA1	① Used in Models H-884K21 (V) (S), H-885K21 (V) (S), H-886K21 (V) (S), H-887K21 (V) (S), H-908K21 (V) (S), H-907K21 (V) (S), H-884KU21, H-885KU21, H-886KU21, H-887KU21, H-908KU21, H-907KU21. ② Used in Models H-882T21 (V) (S), H-883T21 (V) (S), H-884T21, and H-885TU21.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	IF Trap	0Ω						
L2	Ant. Trans.	0Ω CT	0Ω	V-8821-3				
L3	Ant. Coil	0Ω						Channel 13
L4	Ant. Coil	0Ω						Channel 6
L5	Ant. Coils	0Ω						
L6	Ant. Coil	0Ω						Channel 13
L7	Neut. Coil	0Ω						
L8	RF Coil	0Ω						Channel 13
L9	RF Coils	0Ω						
L10	RF Shunt Coils	0Ω						Channel 2 thru 6
L11	RF Coil	0Ω						Channel 8
L12	Osc. Coil	0Ω						Channel 13
L13	Osc. Coil	0Ω						Channel 6
L14	Osc. Coils	0Ω						
L15	Conv. Plate	.3Ω						
L16	Det. Video IF	.1Ω		V-9883-8	17-4534 *	TV-131	6310 *	
L17	47.25MC Trap	0Ω		V-11873-1	30-1047	TV-131	6235	
L18	Fil. Choke	0Ω		V-4886-2	19-1000	TV-189	4603	1.1 Microhenries
L19	Fil. Choke	0Ω		V-4886-2	19-1000	TV-189	4603	1.1 Microhenries
L20	2nd. Video IF	.4Ω	.3Ω	V-9879-4	17-5001	TV-135	6231	
L21	41.35MC Trap	0Ω		V-11873-1		TV-131	6236	
L22	Fil. Choke	0Ω		V-4886-2	19-1000	TV-189	4603	1.1 Microhenries
L23	3rd. Video IF	.4Ω	.3Ω	V-9879-4	17-5001	TV-135	6231	
L24	Series Peaking Coil	4Ω		V-15480-2	19-3125		6153	115 Microhenries
L25	4.5MC Trap	1.3Ω		V-15490-1	20-1004	TV-181	1469	
L26	Series Peaking Coil	7.5Ω		V-15480-4	19-3180	TV-184	6180	179 Microhenries
L27	Shunt Peaking Coil	7.5Ω		V-15480-5	19-3300		6155	390 Microhenries
L28	Series Peaking Coil	1.3Ω		V-4886-1	19-1005	TV-180	6634	14 Microhenries
L29	2nd. Sound IF	1.5Ω		V-15490-1	20-1004	TV-151	1469	
L30	2nd. Sound IF	1.5Ω		V-15490-1	20-1004	TV-151	1469	
L31	RF Choke	5.5Ω		V-15480-8	19-4600	TV-190	6194	350 Microhenries
L32	Quadrature Coil	5.7Ω		V-13196-1	17-3151 ⑧		1461	
L33	Horiz. Osc.	97Ω		V-8764	19-1578	TV-183	6310	
L34	RF Choke	3Ω		V-9099-2	19-1003		4606	3.3 Microhenries, DC part #CLA
L35	Fil. Choke	0Ω		V-4886-2	19-1000		4603	1.1 Microhenries

* Use one winding only.
■ Drill mounting holes.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ^(1/2)	REPLACEMENT DATA Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L36	240ADC	45Ω	1.31Y	V-8471J-3	C5037①	C-2996①	C-2326①	26C44	C-23X

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA Westinghouse PART No. FUSE	Westinghouse PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	1/4A 250V	V-8171-6		312.250 (3AG-1/4A)	357001	AGC 1/4	4405

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

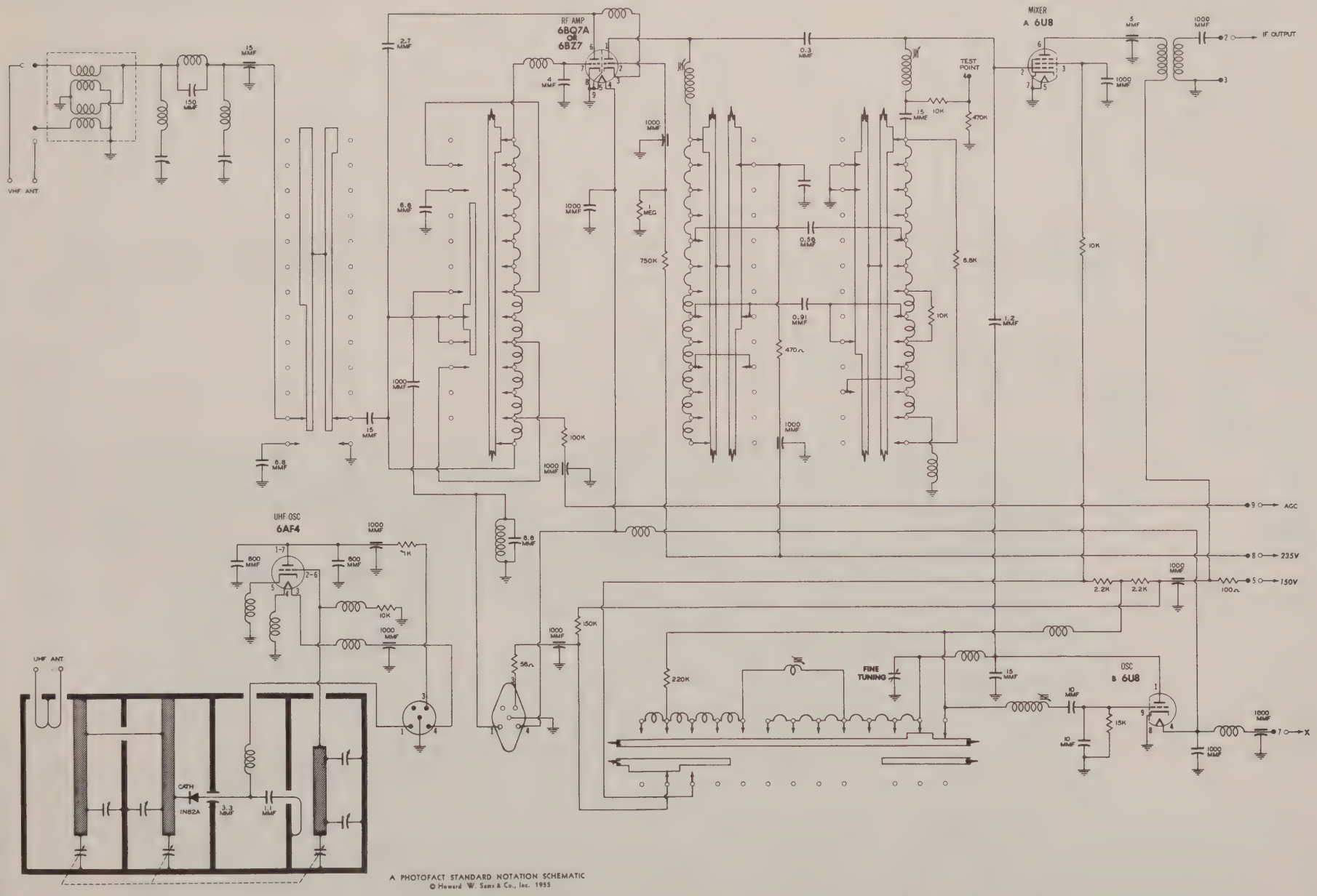
ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		Westinghouse PART No.	SYLVANIA PART No.	
M2	CK706 *	V-10916-1	1N60 or 1N132	Video Detector

* Some versions may use crystal diode type 1N64 in this application.

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M3	Dial Light		#55
M4	Tuner	V-15460-1	VHF - Chassis V-2315-11, -21 , Used in models with letter "V" after model number.
	Tuner	V-14170-2	VHF - Chassis V-2315-15, -25. Used in models with letter "S" after model number
	Tuner	V-14989-1 *	VHF - Chassis V-2325-101, -201
M5	Tuner	V-14990-1*	UHF - Chassis V-2325-101, -201
M6	Video Det. Assy.	V-12128-2	Includes M2, coils and capacitors
M7	Centering Device		Part of deflection yoke rear cover (T4)
M8	Ion Trap	V-9784-4	
B2	Trimmer Cap.	V-11228-2	Horiz. Multivibrator (5-80MMF)
	Cabinet	V-1347-10	Models H-882T21V, S, H-882TU21
	Cabinet	V-1347-11	Models H-883T21V, S, H-883TU21
	Cabinet	V-1393-10	Models H-884K21V, S, H-884KU21
	Cabinet	V-1393-11	Models H-885K21V, S, H-885KU21
	Cabinet	V-1394-10	Models H-886K21V, S, H-886KU21
	Cabinet	V-1394-11	Models H-887K21V, S, H-877KU21
	Cabinet	V-1372-10	Models H-906K21V, S, H-906KU21
	Cabinet	V-1372-11	Models H-907K21V, S, H-907KU21
	Knob	V-14229-6	VHF channel selector - Models H-882T21V, S, H-884K21V, S, H-885K21V, S, H-886K21V, S, H-887K21V, S, H-906K21V, S, H-907K21V, S
	Knob	V-14229-7	VHF channel selector - Models H-883T21V, S
	Knob	V-14520-6	VHF channel selector - Models H-882TU21, H-884KU21, H-885KU21, H-906KU21, H-907KU21
	Knob	V-14520-7	VHF channel selector - Model H-883TU21
	Knob	V-14520-1	VHF channel selector - Models H-886KU21, H-887KU21
	Knob	V-12930-1	VHF fine tuning - Models H-882T21V, S, H-883T21V, S, H-884K21V, S, H-885K21V, S, H-886K21V, S, H-887K21V, S, H-906K21V, S, H-907K21V, S -- UHF tuning - Models H-882TU21, H-883TU21, H-884KU21, H-885KU21, H-886KU21, H-887KU21, H-906KU21, H-907KU21
	Knob	V-14423-1	VHF fine tuning - Models H-882TU21, H-883TU21, H-884KU21, H-885KU21, H-886KU21, H-887KU21, H-906KU21, H-907KU21
	Knob Assy.	V-14219-1	UHF dial - Models H-882TU21, H-883TU21, H-884KU21, H-885KU21, H-886KU21, H-887KU21, H-906KU21, H-907KU21
	Knob	V-12913-8	On-off-volume - Models H-882T21V, S, H-882TU21, H-884K21V, S, H-885K21V, S, H-884KU21, H-885KU21, H-886K21V, S, H-887K21V, S, H-886KU21, H-887KU21, H-906K21V, S, H-907K21V, S, H-906KU21, H-907KU21
	Knob	V-12913-9	On-off-volume - Models H-883T21V, S, H-883TU21
	Knob	V-12914-1	Picture - All models
	Safety Glass	V-15446-1	Models H-882T21V, S, H-883T21V, S, H-882TU21, H-883TU21, H-884K21V, S, H-885K21V, S, H-884KU21, H-885KU21, H-906K21V, S, H-907K21V, S, H-906KU21, H-907KU21
	Safety Glass	V-14507-1	Models H-886K21V, S, H-887K21V, S, H-886KU21, H-887KU21
	Mask	V-15305-2	All models (Includes safety glass)
	Mask	V-15306-1	Models H-906K21V, S, H-907K21V, S, H-906KU21, H-907KU21 (less safety glass).

* Combined part numbers V-14989-1 and V-14990-1 may be obtained under part number V-14130-1.



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RF TUNER - PART No. V-14130-1 - USED IN Ch. V-2325-101, -201

PROPERTY OF
L. F. BLANKENSHIP
3924 WEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16 and V17. Check fuse, M1. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check T2, T4A, C82, C83, C84, C85, R11, R93 and other associated components.	Check L33, C79, C73, C80, C81, C2D, R90, R85, R87, R89, R88 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16 and V18. Check C80, C81, R93, R11 and other associated components.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check R93, R95, C81, T2 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video."

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound."

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set."

KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

PRODUCTION CHANGES

The following production changes were made during production. Whenever possible the reason for the change is also given.

TO IMPROVE HORIZONTAL SWEEP STABILITY

A new integrator network has been added in later production. The input distributed capacity of the integrator network has been decreased which in turn increases the amplitude of the horizontal sync pulse resulting in greater stability.

TO INCREASE SIGNAL TO NOISE RATIO

R27 is increased from 100KΩ to 120KΩ.

TO IMPROVE HIGH FREQUENCY RESPONSE OF VIDEO AMPLIFIER

C40 and R57 are added.

L27 is decreased from 290MH to 170MH.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

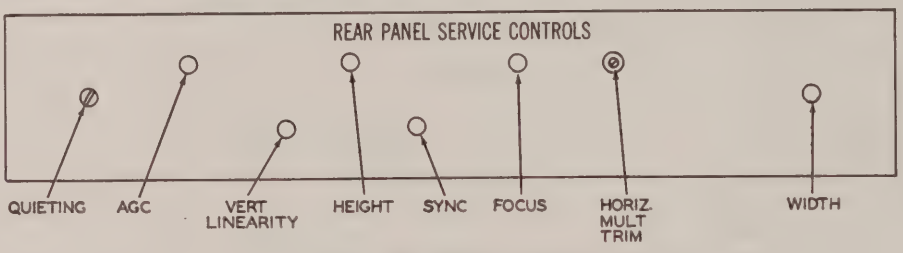
PICTURE TUBE SAFETY GLASS CLEANING

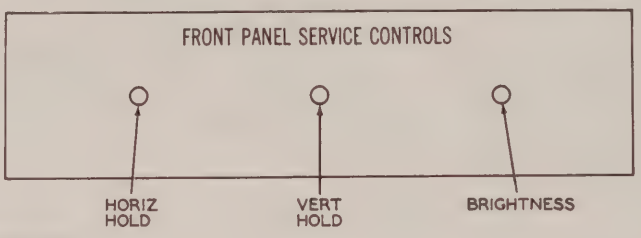
For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION





SPECIAL ADJUSTMENTS

AGC CONTROL ADJUSTMENT

The AGC control (R6) is located on the rear apron of the chassis and can be adjusted without removing the chassis. With the receiver warmed up, tune to the strongest TV signal available. Rotate the AGC control clockwise until the receiver begins to overload with unstable sync. Rotate control counter clockwise until best picture and stable sync is obtained. On weak signals adjust for minimum snow in picture.

SYNC CONTROL ADJUSTMENT

The sync control (R9) is located on rear apron of the chassis and can be adjusted without removing the chassis. Tune in a TV station and adjust vertical and horizontal controls for normal picture. Rotate R9 counter clockwise until maximum stable sync is obtained. Rotate channel selector to all available stations in that area. Check for stable sync on all channels. If necessary, slightly retouch R9.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator coil (L33) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the quieting control located on rear apron of chassis. Adjust for minimum noise hiss in sound.

FUSES

One fuse is used for horizontal and vertical sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 8 wood screws. Remove rear cover.
3. Disconnect antenna leads and speaker plug.
4. Remove 6 chassis bolts and 1 bolt holding yoke assembly to cabinet. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.

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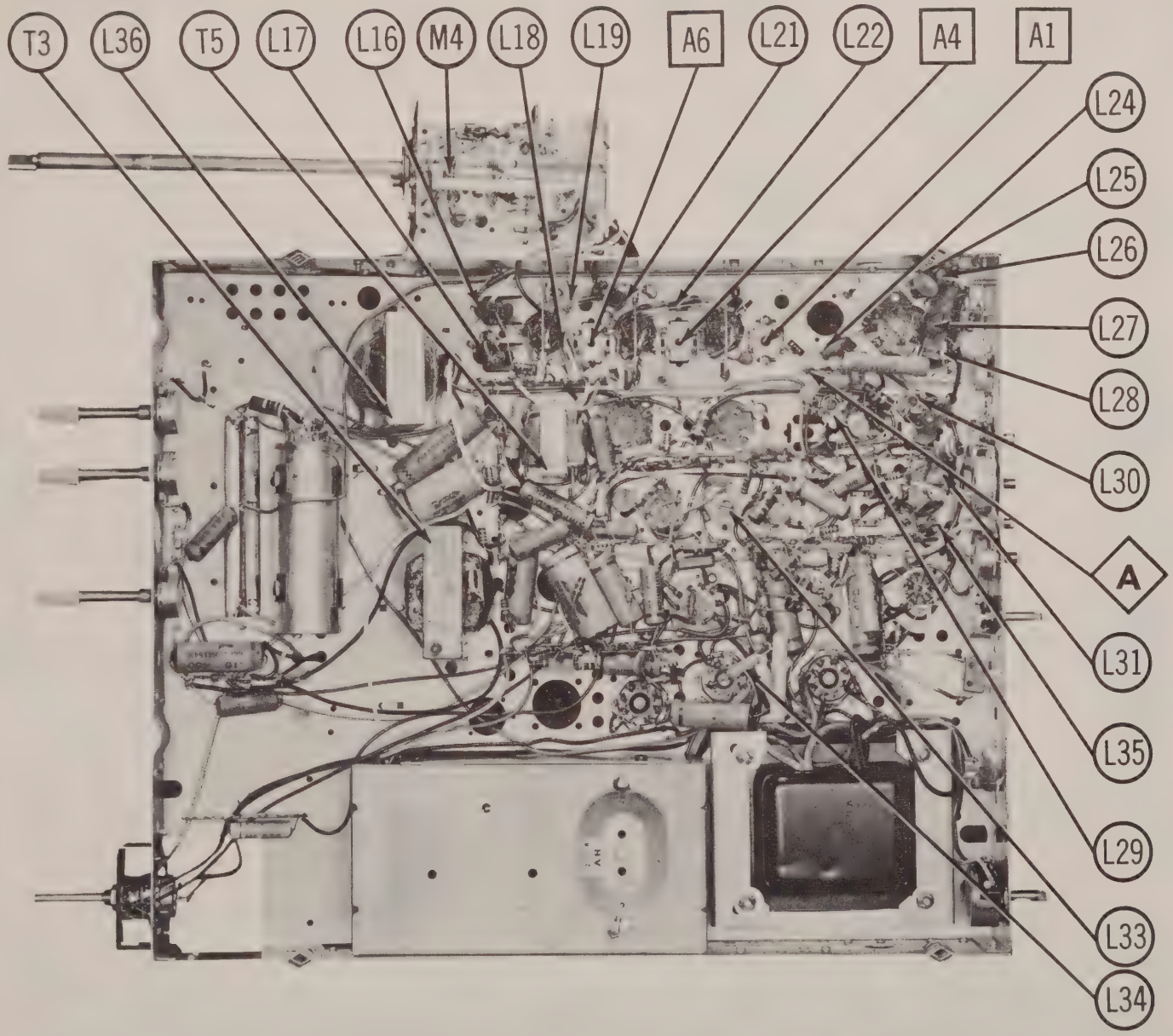
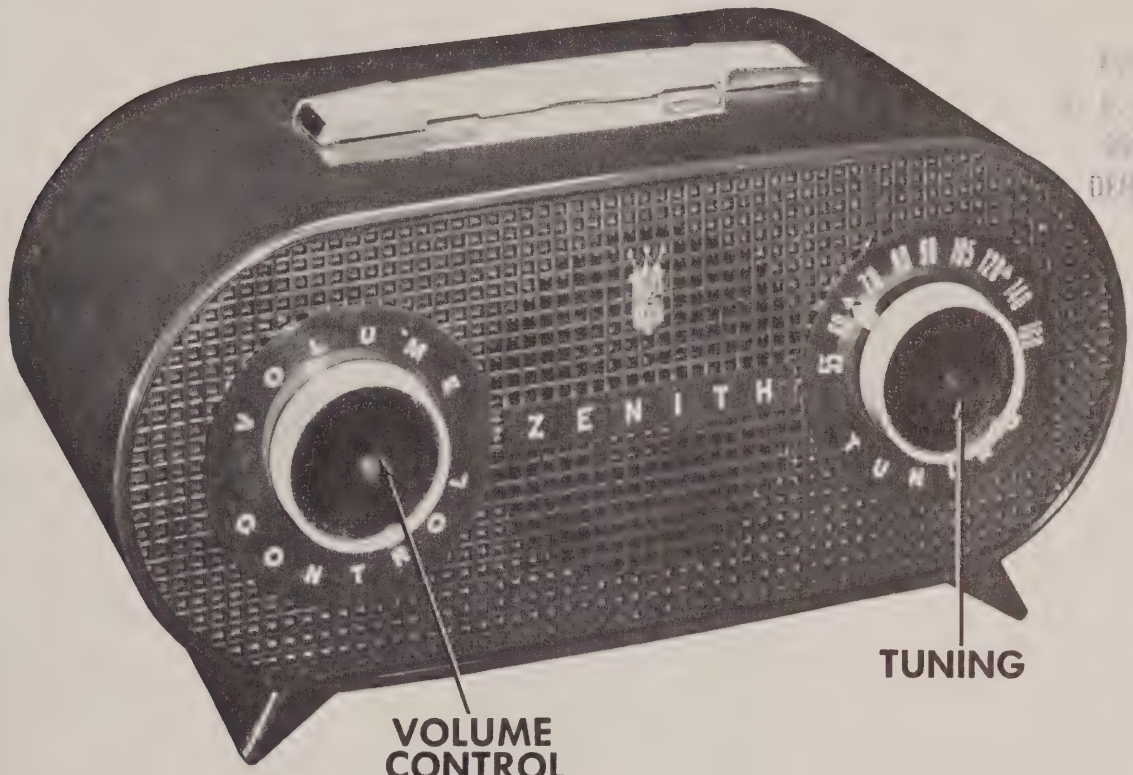


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

ZENITH MODEL
R510Z1 (Ch. 5MO2Z1)



ZENITH MODEL
R510Z1 (Ch. 5MO2Z1)

TRADE NAME	Zenith Model R510Z1 (CH. 5MO2Z1)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier.
POWER SUPPLY	110-120 Volts AC-DC
RATING	.24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5MFD	High side to pin 7 ((grid) of 12BE6 (V1). Low side to B-.	455KC (400∿ Mod.)	600KC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	1400KC	"	A6	"

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PARTS LIST AND DESCRIPTIONS

ZENITH
Model R510Z1 (Ch. 5MO2Z1)

PARTS LIST AND DESCRIPTIONS (Continued)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■60	150	22-2678			FP311.4	TM-6020-150	D-075	
B	▲20	150							
C2	.05	200	22-829	DF-503		PT415	IMP4-S5	330415	
C3	50		105-35 ♦						
C4A	5000		105-36 ‡						
B	5000								
C	250								
D									
C5A	5000		105-37 ▬						
B	5000								
C	500								

■ Items C3, R2A, R2B, and R2C are combined in one unit.
‡ Items C4A, C4B, C4C, C4D, R3A, R3B, and R3C are combined in one unit. When replacing items separately, items C4C and C4D should total 250MMF.
▬ Items C5A, C5B, and C5C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1Meg	½	63-3227					Volume & Switch-See Note

Note 1. Volume control and bearing strip Part No. 83-2370.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2A	22KΩ	½	♦115-35	BTS-22K	
B	70Ω	½		BTS-68	
C	2.2Meg	½		BTS-2.2Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R3A	4.7Meg	½	†105-36	BTS-4.7Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R4	150Ω	½	63-1750	BTS-150	
R5	1000Ω	2	63-3237	BTB-1000	

♦ Items R2A, R2B, R2C, & C3 are combined in one unit.
† Items R3A, R3B, R3C, C4A, C4B, C4C, & C4D are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2.4KΩ	3.6Ω	95-1404	Z1101	A-3025	A-3332	26S58①	S-12X	① Drill one new mounting hole.

SPEAKER

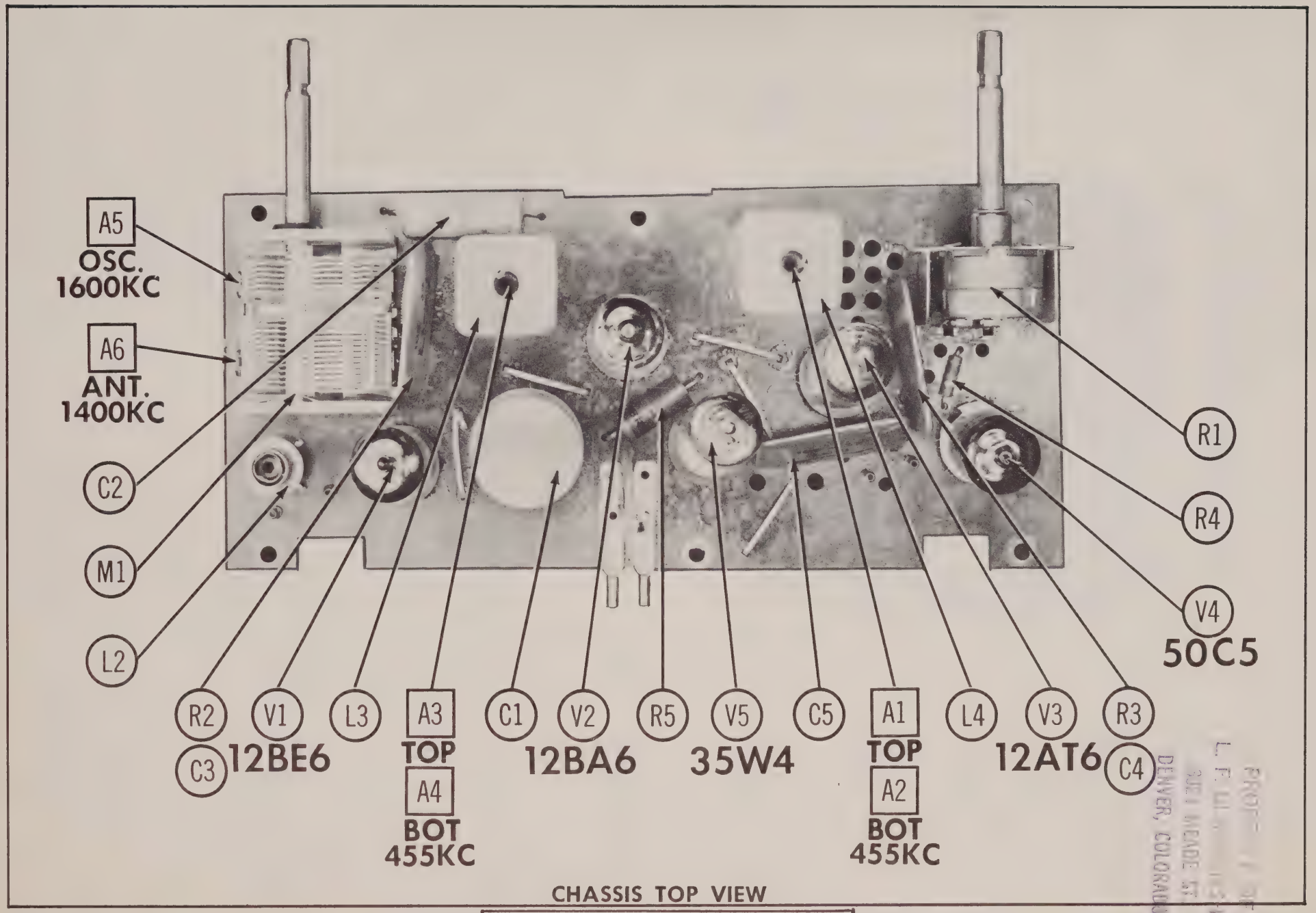
ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	4"	PM	3.6Ω	49-762	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop antenna	3.3Ω		S-21887				
L2	Osc. coil	.6Ω	6.3Ω	S-21776				Coil Insert #94-81Z (Core Part #149-85)
L3	Input IF	18Ω	18Ω	95-1438	16-6758	BC-352	13-PC1	Alternate Part No. 95-1403
L4	Output IF	18Ω	18Ω	95-1439	16-6758	BC-353	13-PC2	Alternate Part No. 95-1403

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M1	Tuning Cap.	22-2601	2 Gang
	Cabinet	14-1642	
	Handle	36-81	
	Knob	46-1252	On-Off-Volume
	Knob	46-1257	Tuning
	Pointer	59-301	

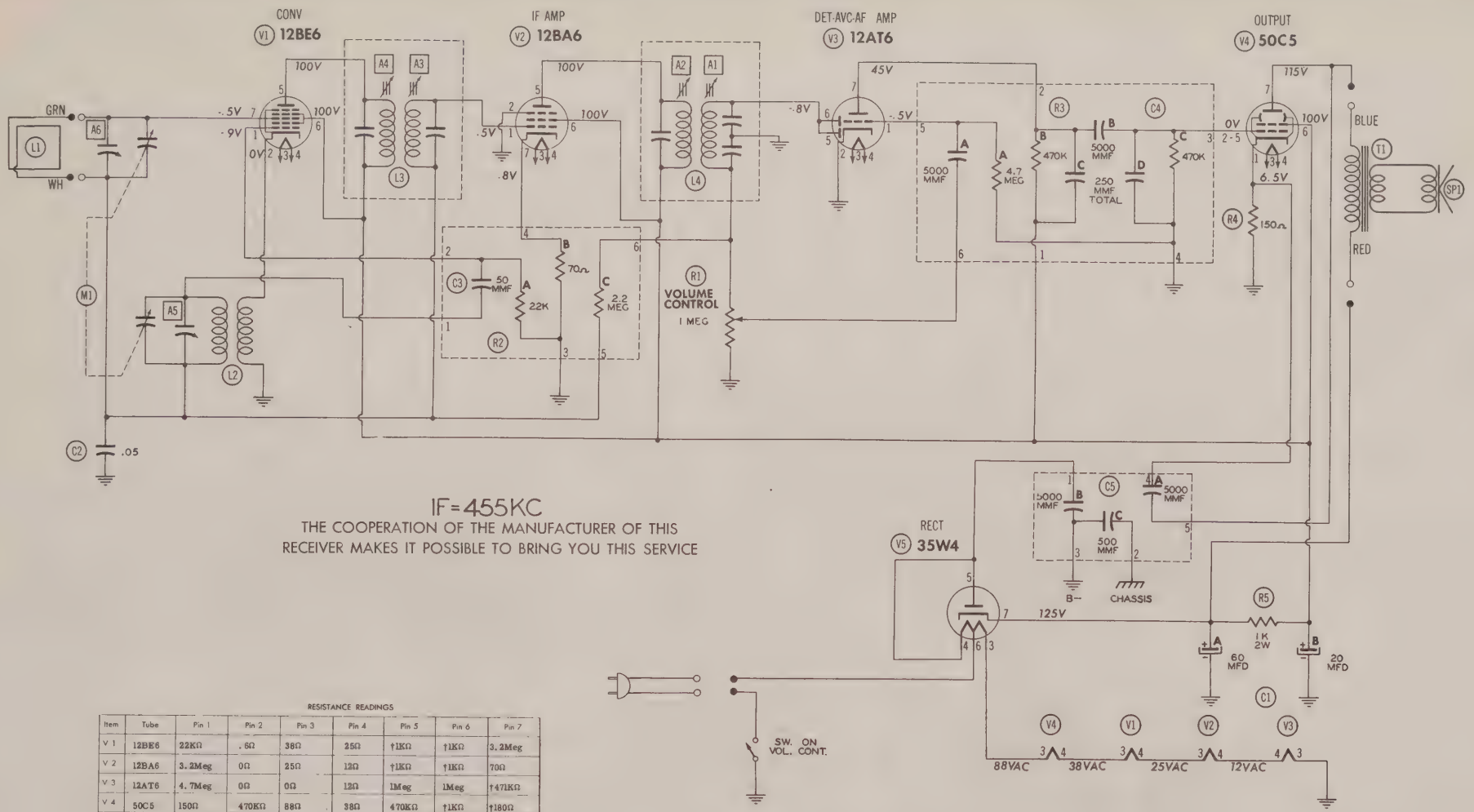


CHASSIS TOP VIEW

ZENITH
Model R5102I (Ch. 5M02ZI)

SET 294 FOLDER 12

PROF
L. F. U
3021 MEADE ST
DENVER, COLORADO



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.6Ω	38Ω	25Ω	†1KΩ	†1KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	25Ω	12Ω	†1KΩ	†1KΩ	70Ω
V 3	12AT6	4.7Meg	0Ω	0Ω	12Ω	1Meg	1Meg	†471KΩ
V 4	50C5	150Ω	470KΩ	88Ω	38Ω	470KΩ	†1KΩ	†180Ω
V 5	35W4	NC	NC	88Ω	118Ω	118Ω	112Ω	150KΩ

†MEASURED FROM PIN 7 OF V5.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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ZENITH MODELS
T402F, V, Y (Ch. 4T42)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ZENITH MODELS
T402F, V, Y (Ch. 4T42)

TRADE NAME	Zenith Models T402F, V, Y (Ch. 4T42)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	Battery Operated Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY RATINGS	1.5 Volts "A" Supply & 67.5 Volts "B" Supply 250MA @ 1.5 Volts DC & 10MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximim position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5MFD	High side to pin 6 (grid) of 1R5. Low side to chassis.	455KC (400~Mod)	Tuning gang fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	Tuning gang fully open	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune for max. signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amplifier	1U4	1U4	6AR	
V3	Det-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1	8	70	22-2433			TC41	TD-8-150	FM-1508	
C2	10000		22-3	DD-103	811-01	DC-511	IMP2-S1	330211	
C3	10000		22-3	DD-103	811-01	DC-511	IMP6-S1	330611	
C4	100		22-5	DD-101	801-101	UC-531		K-1310	
C5	10000		22-3	DD-103	811-01	DC-511	IMP6-S1	330611	
C6	4700		22-4	DD-472	811-0047	DC-525	IMP6-D47	C-1247	
C7	4700		22-4	DD-472	811-0047	DC-525	IMP6-D47	C-1247	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	63-3168	Q13-137	A47-1Meg-Z	BSK-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R2	100KΩ	½	63-1870	BTS-100K	
R3	1000Ω	½	63-1786	BTS-1000	
R4	6.8Meg	½	63-1947	BTS-6.8Meg	
R5	4.7Meg	½	63-1940	BTS-4.7Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R6	4.7Meg	½	63-1940	BTS-4.7Meg	
R7	1Meg	½	63-1912	BTS-1Meg	
R8	3.3Meg	½	63-1933	BTS-3.3Meg	
R9	300Ω 5%	½	63-1762	BTS-300 5%	

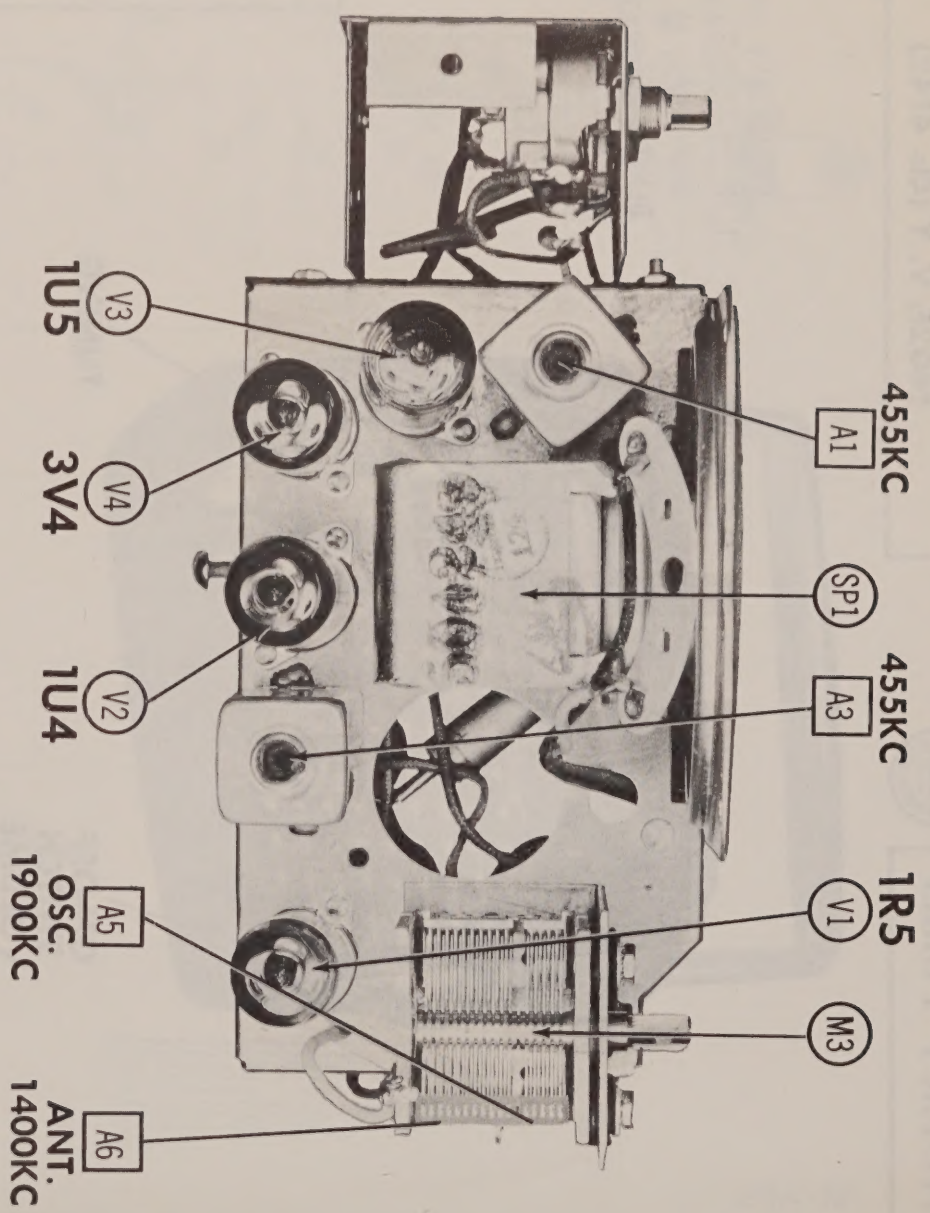
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.1	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9.2KΩ	3.2Ω SEC.2 1.35Ω RES	95-1433						

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	3½"	PM	3.2Ω	49-730	3A07	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: MILLER PART No.	NOTES
L1	Ant. Coil	.9Ω		S-22726				Core part #149-85
L2	Osc. Coil	1.8Ω	8Ω	S-19660				
L3	Input IF	23Ω	23Ω	95-1422	16-6758 *	BC-352 *	12-C1 *	
L4	Output IF	23Ω	23Ω	95-1423	16-6770 *	BC-355 *	12-C6 *	

* Leads sufficient mounting support.

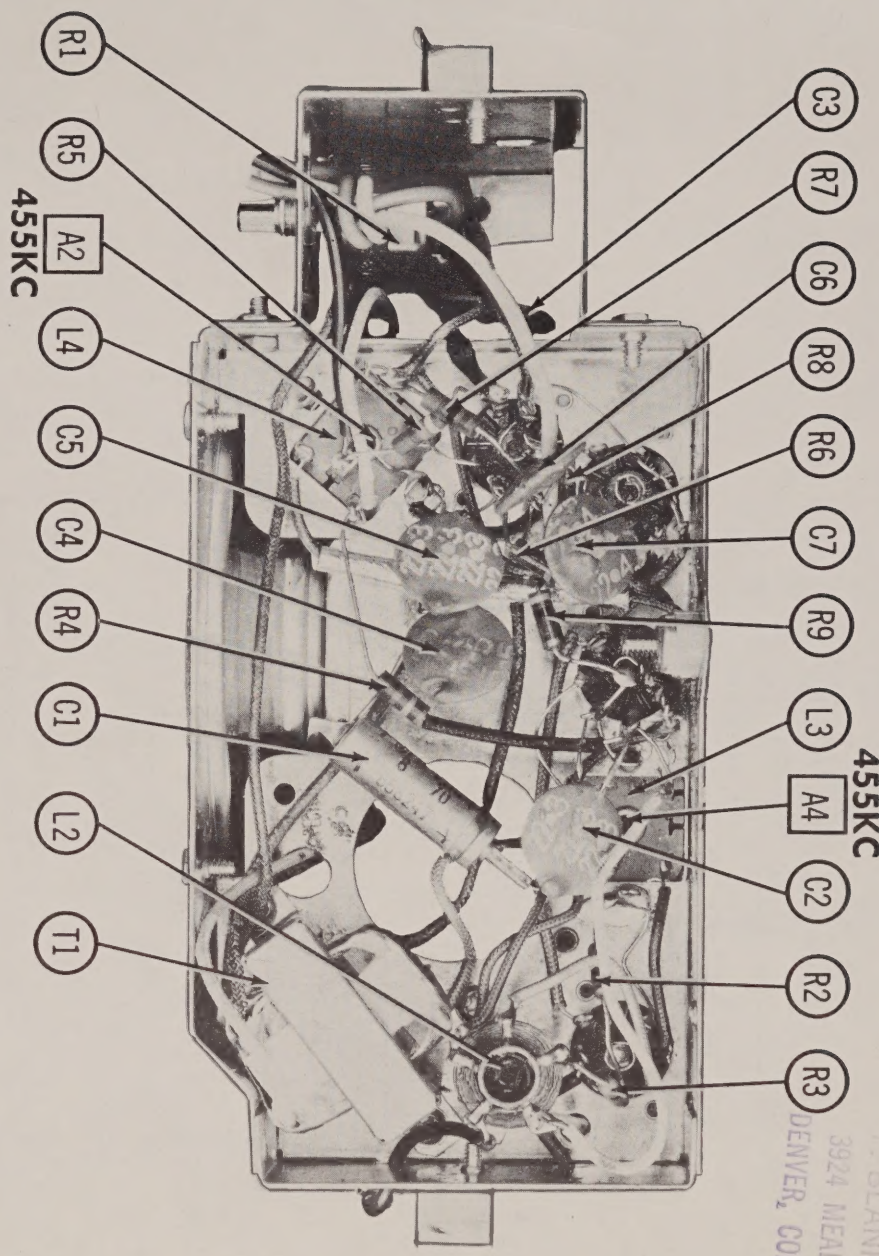
BATTERIES

ITEM No.	VOLTAGE	ZENITH PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M1	1.5V	Z5	964			2IR			Connect 2 in parallel
M2	67.5V	Z67		467			XX45		

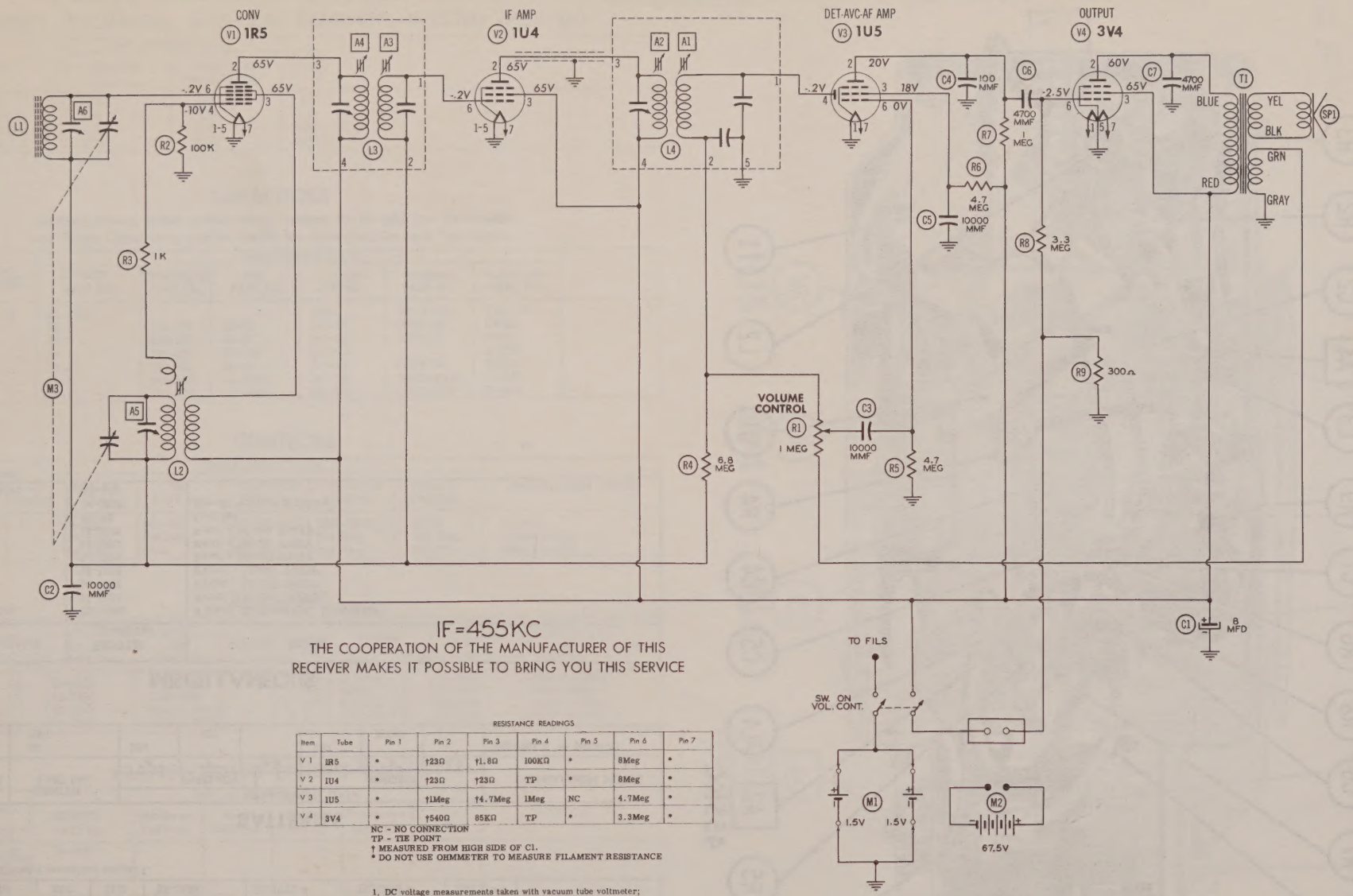
MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Tuning Cap.	22-2663	2 Gang (12-260MMF, 11-90MMF)
	Cabinet	14-1522	Front - Model T402Y
	Cabinet	14-1828	Front - Model T402V
	Cabinet	14-1829	Front - Model T402F
	Cabinet	14-1527	Rear - Model T402Y
	Cabinet	14-1832	Rear - Model T402V
	Cabinet	14-1833	Rear - Model T402F
	Handle	36-68	Cabinet
	Knob	46-1085	On-off-volume & tuning
	Dial Pointer	59-306	

CHASSIS—BOTTOM VIEW



ZENITH MODEL T402F (Ch. 4T42)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†23Ω	†1.8Ω	100KΩ	*	8Meg	*
V 2	1U4	*	†23Ω	†23Ω	TP	*	8Meg	*
V 3	1U5	*	†1Meg	†4.7Meg	1Meg	NC	4.7Meg	*
V 4	3V4	*	†540Ω	85KΩ	TP	*	3.3Meg	*

NC - NO CONNECTION
TP - TIE POINT
† MEASURED FROM HIGH SIDE OF C1.
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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294-13